

PROCUREMENT METHODS AND CONTRACTOR'S BIDDING STRATEGY IN MIDDLE EAST CONSTRUCTION INDUSTRY

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A project report submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Science (Construction Management)

Faculty of Civil Engineering
Universiti Teknologi Malaysia

JANUARY 2014

This project report is dedicated to my parents without their love and support it could not have been produced

ACKNOWLEDGEMENT

I would like to express the deepest appreciation to my supervisor **Mr. Bachan singh** for his constant support during my study at UTM. He inspired me greatly to work on this project. His willingness to motivate me contributed tremendously to our project. I have learned a lot from his and I am fortunate to have his as my mentor and supervisor.

Besides, I would like to thank the authority of Universiti Teknologi Malaysia (UTM) for providing me with a good environment and facilities such as Computer laboratory to complete this project with software which I need during process.

Finally I wish to thank my parents for all the love, kindness, motivation and help shown to me during the period of studies and preparation of this thesis.

ABSTRACT

The type of procurement methods used in the implementation of the projects is vital for the client. The implementation of the projects using the unsuitable procurement method will contribute to the failure of the project being completed within the budget, time and quality. The strategy of the contractor also depends on the types of procurement used. The common method of procurement used by the client is the Traditional method. Some of the contractors and the clients do not favour this procurement method. The aim of this study is to determine the current procurement methods available in the Middle East construction industry and the factors affecting bidding strategies of the contractors. The objectives of the study are to evaluate the current procurement methods in the Middle East construction industry and to identify the preferred procurement method, to assess the factors affecting the bidding strategy of the contractors in the Middle East construction industry and to identify the factors that are taken into consideration by the contractors before deciding to bid for the project. The data are collected through questionnaires and interviews. A total of 25 respondents comprising of Project manager, Construction manager, Site engineer and Site supervisor were identified. The data is analyzed by using SPSS. From the study, the current procurement methods in the Middle East construction industry are Traditional method, Design & Build and Package Deal. The preferred procurement methods in the Middle east are contract management, Design & build, Develop & construct and turnkey method. The factors affecting the bidding strategy of the contractors in the Middle East construction industry are past experience, type of owner and past loss and profit. The factors that are taken into consideration by the contractors before deciding to bid for the project are availability of time for tendering, type of project and project size..

ABSTRAK

Jenis-jenis kaedah perolehan yang digunakan dalam pelaksanaan sesuatu projek adalah penting kepada pelanggan. Pelaksanaan sesuatu projek yang menggunakan kaedah perolehan yang tidak sesuai akan menyumbang kepada kegagalan projek itu disiapkan dalam bajet yang ditetapkan, masa dan juga kualiti. Strategi kontraktor juga bergantung kepada jenis perolehan yang digunakan. Kaedah biasa perolehan digunakan oleh pelanggan adalah kaedah tradisional. Sebahagian daripada kontraktor dan pelanggan tidak menggunakan kaedah perolehan ini. Tujuan kajian ini adalah untuk menentukan kaedah perolehan yang sedia ada dalam industri pembinaan di Timur Tengah dan faktor-faktor yang memberi kesan kepada strategi bidaan oleh kontraktor. Objektif kajian ini adalah untuk menilai kaedah perolehan semasa di dalam industri pembinaan di Timur Tengah dan untuk mengenal pasti kaedah perolehan yang digunapakai, untuk menilai faktor yang mempengaruhi strategi pembida kontraktor dalam industri pembinaan di Timur Tengah dan untuk mengenal pasti faktor-faktor yang diambil kira oleh kontraktor sebelum membuat keputusan untuk membida sesuatu projek tersebut. Data yang dikumpul adalah melalui soal selidik dan temu bual. Seramai 25 orang responden yang terdiri daripada Pengurus projek, pengurus pembinaan, jurutera tapak dan penyelia projek telah dikenal pasti. Data yang diperolehi dianalisis dengan menggunakan SPSS. Dari kajian ini, kaedah perolehan semasa di dalam industri pembinaan di Timur Tengah adalah menggunakan kaedah tradisional, "Design & Build" dan "Package Deal". Kaedah perolehan pilihan di Timur Tengah adalah pengurusan kontrak, "Design & Build", "Develop & Build" dan kaedah turnkey. Faktor-faktor yang memberi kesan kepada strategi pembida kontraktor dalam industri pembinaan di Timur Tengah adalah pengalaman, jenis pemilik dan membandingkan dengan keuntungan yang lepas. Faktor-faktor yang diambil kira oleh kontraktor sebelum membuat keputusan untuk membuat tawaran projek adalah masa untuk membuat tender, jenis projek dan saiz projek.

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CHAPTER 1

INTRODUCTION

1.1 Background

Professionalism can be defined as attributes and methods to proceed a purpose of a person or a project in profession that the others can trust him or her to do its activities in a correct way (Farndale, 2005). In order to raise the level of professionalism, associations usually are formed with common goals, including employment standards and Codes of ethics, sustainable development of the members' capabilities, identification of interacting methods to do a plan in the community will be considered. In this regard, numbers of international experts in construction industry believe that the methods of professionalism as a significant tool and lever are the major facing challenges to increase its effectiveness continuously (Boselie & Paauwe, 2005). Development of procurement methods employed in construction industry is one of the proposed actions in order to develop professionalism in construction industry (Brockbank & Ulrich, 2001).

1.2 Introduction to Procurement Methods and construction bidding strategies taken by contractors

Construction project procurement systems practiced in the industry have been subjected to changes resulting in many newly developed procurement systems that

could be used to meet contemporary requirements of the clients. In dealing on which procurement system to apply, there is a need to take into consideration various factors before any practical decisions can be made as the wrong selection of construction procurement approach usually leads to project failure or general clients dissatisfaction. Therefore, a systematic approach for the selection of the most appropriate system is essential to aid the clients to achieve their ultimate project goals, thus to ensure best value for their money.

The procurement of construction project is "vast in scope" because it involves the gathering and organizing of myriads of separate individuals, firms and companies to design manage and build construction products such as houses, office buildings, shopping complex, roads, bridges etc. for specific clients or customers. Procurement the word procure which literally means "to obtain by care or effort"; "to bring about" and "to acquire". System is about "organized method, approach, technique, process or procedure".

However Rosli (2006) described project procurement as an organized method or process and procedure for clients to obtain or acquire construction products. Many new procurement systems evolved during the 1980s and 1990s, giving greater choice and "flexibility (Ivor H. Seeley, 1984) and it is vital that clients make the correct choice of building procurement method in an increasingly complex situation, with a wide range of objective criteria and procurement system.

The Aqua Group (1999) described procurement as the process of obtaining or acquiring goods and services from another for some consideration. However, Masterman (1996) described project procurement as the organizational structure needed to design and build construction projects for a specific client. From the definition by Masterman and The Aqua Group, it can be concluded that the procurement is a process of obtaining a building by fulfilling client's requirement which involves a group of people who are team up together and organized systematically in term of their role, responsibilities and interrelation between them.

Therefore the different procurement system contribute to different project performances in term of allocation of responsibilities, activities sequence process and procedure and organizational approach in project delivery. Therefore a suitable procurement method have to be made in order to fulfill clients need regard to certainty of price, cost limits, time requirements, complexity of design and many other factors.

The development of the construction industry has led to an increase in the number of criteria imposed by project clients for selecting contractors. Traditionally, the evaluation of contractors has emphasized on the tender price, with less attention given to evaluating a contractor's performance attributes (Jennings and Holt, 1998; Kumaraswamy and Walker, 2000; Wong *et al.*, 2001; Shen *et al.*, 2004; Waara and Bröchner, 2006). Nevertheless, the recognition that a high-quality service cannot be obtained if only the lowest tender is accepted has led to a growing urge for a shift from the 'lowest-price wins' to the 'multicriteria selection' practice in the contractor selection process. Hatush and Skitmore (1997) suggested that the evaluation of contractor competence should consider a wide range of factors such as financial soundness, technical ability, management capability, reputation and safety performance. El-Sawalhi *et al.* (2007) proposed a contractor pre-qualification model in which they used the following selection criteria: financial stability; management and technical ability; experience in terms of type, size, number, location and business duration of projects; historical non-performance in terms of company image, skilled manpower, client satisfaction, record of failure and claims; availability of manpower and equipment; quality referring to policies, control and assurance and indicators of health and safety about performance, illness and hazard at work.

A significant amount of engineering construction work is let through competitive bidding (Drew *et al.*, 2001). Direct competition through bidding is the most common method of job distribution in the construction industry. Contractors need to make strategic decisions in respect of: (i) project selection—whether or not to bid for a job; and (ii) determination of bid price if contractors

choose to bid (Oo, et al. 2007). With limited response time to different bidding opportunities, contractors need to strive for projects that put them at an advantage in terms of pricing efficiency. In examining the ‘right’ price in construction bids. Wallwork (1999) argues that contractors’ abilities to win the ‘right’ project and determine the ‘right’ price level are of equal importance for survival of their organizations and subsequently making a profit.

1.3 Statement of Problem

A Middle East country contains many construction projects everywhere in different sizes. As far, there are many important construction projects in the country; the role of a procurement methods and bidding strategies taken by contractors are the two of the significant factors to push the projects towards productivity followed by contractors’ activities and abilities. Issue of untimely completion followed by defects from contractors in handling projects due to non recognition of the procurement methods and the factors supporting bidding strategy in a project can mean not to return investment timely and following that appearance of inflation in economy consequently. Therefore, it has been as a problem which countries have faced. A Middle East country has not benefited in the area of manufacturing industry scientifically and technologically rather than developed countries.

The most significant goals of a construction projects’ authorities are timely completion, quality and cost control. The two issues such as procurement methods and bidding strategies employed by contractors can affect the goals directly and indirectly. Thus, recognition of the best procurement methods and the factors promoting the bidding strategies could attract the researcher attention. Therefore, the following questions are defined as the research questions in this study.

1.4 Research Questions

The following questions have been established and conducted in order to find solutions related to statement of the problems:

- What procurement method can be the best and the most practical in construction project in the Middle East country?
- What are the priorities of the items affecting bidding strategy of the contractor in the construction project in the Middle East country?
- What are the priorities of the characteristics of the project taken into consideration from a contractor before entering into bidding?

1.5 Aim and Objectives of the Research

To determine the most practical procurement method, the items affecting bidding strategies, and the characteristic of the project before bidding step from contractors in order to run a construction project smoothly towards a successful consequences such as timely and proper projects' productivity at construction industry, the following objectives could be stated:

- 1) To identify the type of procurement method preferred by the contractor in the bidding for the project.
- 2) To evaluate the bidding strategy of the contractor in the construction project.
- 3) To evaluate the characteristics of the project taken into consideration by the contractor before bidding for the project.

1.6 Scope

This research focuses on investigate the most practical procurement methods, the items affecting bidding strategy to be taken by a contractors and characteristics of a projects which can be considered from the contractors in the Middle East country. In this research, for the first objective, interview is employed and for the second and the third objective, Delphi method was used to collect data and classify them the tool of gathering data were the questionnaires. In order to analyze the data SPSS software was employed. The participants in this study are experienced experts, managers and supervisors in construction projects in the Middle East country.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Strategies for the procurement of building projects have not changed significantly in the last 25 years, though time and cost overruns are still prevalent throughout the industry (Smith and Love, 2001). In a response to reduce the incidence of time and costs overruns, the disputes that may often arise, and the likelihood of project success, alternative forms of procurement method such as partnering and alliancing have been advocated (Love *et al.* 1998). Not all forms of procurement method, however, are appropriate for particular project types, as client objectives and priorities invariably differ (Skitmore and Marsden, 1988; Love *et al.* 1997). The objectives and priorities of a client need to be matched to a procurement system. To do this effectively, it is essential that the characteristics of various procurement systems and selection methods available are understood by clients and their advisors before a procurement method is selected.

2.2 Procurement Strategy

New building or renovation/adaptation of an existing building is necessary only when no other building exists or appears to exist that will meet or appears to meet the needs of a client (Turner, 1990). A building project is one way of delivering

a solution to the particular business needs of clients, whether for investment, expansion or improved efficiency. When a new build solution is selected, rather than renting, leasing or purchasing existing real estate, there is usually the need for a bespoke solution that aims to meet particular objectives. Identifying these objectives and prioritising them can be a difficult task considering the array of stakeholders typically who may be involved within the client organisation (Smith *et al.* 2001).

As a result, adequate consultation and dialogue between stakeholders needs to have been undertaken before project objectives are prioritised (Smith and Love, 2000). New build projects are invariably unique one-off designs and built on sites that are also unique in nature (Turner, 1990). Thus, when considering a strategy to deliver a project, a client should be made aware of the complex array of activities and processes that are involved with the procurement process so that they can be appropriately managed (Gordon, 1994). The New South Wales Government (2005) states that the selection of a procurement methodology essentially involves establishing:

- the most appropriate overall arrangements (or delivery system) for the procurement;
- a contract system for each of the contract or work packages involved as components of the chosen delivery system; and
- how the procurement will be managed by the agency (or management system), to suit the delivery system and contract system(s) selected.

A plethora of procurement strategies have been developed to deal with the need to successfully deliver building projects (e.g., RICS 1996). A procurement strategy outlines the key means by which the objectives of the project are to be achieved (NSW, 2005). NEDO (1985) identified seven steps to successful building procurement:

- 1) Selecting an in-house project executive

- 2) Appointment of a principal adviser
- 3) Care in deciding the client's requirements
- 4) Timing the project realistically
- 5) Selecting the procurement path
- 6) Choosing the organisations to work for the client
- 7) Designating a site or building for remodelling

The NSW Government (2005), for example, have developed a very detailed and comprehensive procurement strategy, which comprises of ten stages:

- 1) Identify and quantify a service demand for a genuine delivery need in an outcomes strategy.
- 2) Identify service delivery options for meeting the need with stakeholder and preliminary risk analysis.
- 3) Justify proposed option with option evaluation, some financial/economic appraisal and strategy report.
- 4) Define preferred project with brief, risk/benefits analysis, business case and authority to proceed.
- 5) Define/select project procurement strategy with brief, risk/benefits analysis and risk management plan, initial methodology report and later strategy report.
- 6) Define project specification with tender documents, estimate and tender evaluation plan for each contract.
- 7) Call/close evaluate tenders for each contract and recommend/approve/engage best project suppliers.
- 8) Project implementation with supplier(s) carrying out contract work and asset delivery
- 9) Asset operation/maintenance and then disposal after supplier(s) completes asset delivery.
- 10) Project evaluation during/after delivery comparing outcomes sought and achieved, and using lessons learnt.

The procurement method chosen in ‘steps 5’ above will influence the degree of integration and collaboration that will take place between project team members, particularly the contractor. The greater the integration between project members the more likely a project is in achieving a successful outcome (Dissanayaka, 1998). Noteworthy, the procurement method that is chosen for a given project will influence the degree of integration that occurs between project team members, as this will depend upon the point in time when the contractor is appointed in the procurement process. The selection of an independent advisor can assist a client with the identification of risks associated with the procurement process.

2.3 Factors Influencing Procurement Strategy

For any given project a client can adopt a collaborative strategy, such as partnering irrespective of the procurement method used. Such a strategy has been often used by clients who have series of projects to undertake. The performance of both contractors and consultants can be monitored using pre-defined indicators for each of the projects they are involved with and then compared. This approach is particularly useful to monitor and evaluate disbursement of incentives where appropriate (Morledge *et al.*, 2006). Once the primary strategy for a project has been established, then the following factors should be considered when evaluating the most appropriate procurement strategy (Rowlinson, 1999; Morledge *et al.* 2006):

- *External factors*: consideration should be given to the potential impact of economic, commercial, technological, political, social and legal factors which influence the client and their business, and the project team during project’s lifecycle. For example, potential changes in interest rates, changes in legislation and so on.
- *Client resources*: a client’s knowledge, the experience of the organisation with procuring building projects and the environment within which it operates will influence the procurement strategy adopted. Client objectives are influenced by

the nature and culture of the organisation. The degree of client involvement in the project is a major consideration.

- *Project characteristics:* The size, complexity, location and uniqueness of the project should be considered as this will influence time, cost and risk.
- *Ability to make changes:* Ideally the needs of the client should be identified in the early stages of the project. This is not always possible. Changes in technology may result in changes being introduced to a project. Changes in scope invariably result in increase costs and time, especially they occur during construction. It is important at the outset of the project to consider the extent to which design can be completed and the possibility of changes occurring.
- *Cost issues:* An assessment for the need for price certainty by the client should be undertaken considering that there is a time delay from the initial estimate to when tenders are received. The extent to which design is complete will influence the cost at the time of tender. If price certainty is required, then design must be complete before construction commences and design changes avoided.
- *Timing:* Most projects are required within a specific time frame. It is important that an adequate design time is allowed, particularly if design is required to be complete before construction. Assurances from the design team about the resources that are available for the project should be sought. Planning approvals can influence the progress of the project. If early completion is a critical factor then design and construction activities can be overlapped so that construction can commence earlier on-site. Time and cost tradeoffs should be evaluated.

2.4 Construction Project Procurement System

Mastermann (1994) classify project procurement systems into several categories based on the relationship and critical interaction between design and construction responsibilities. The categorization of the Various procurement systems are as follows:

- 1) separated and Cooperative System
- 2) Integrated System
- 3) Management Oriented System

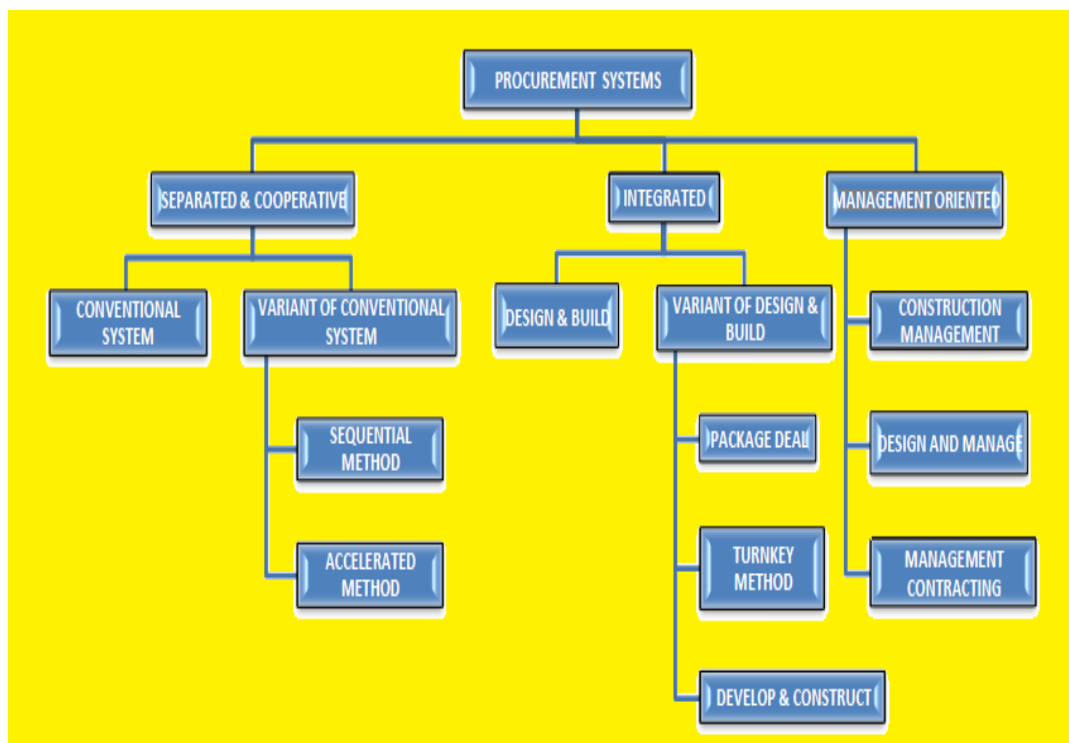


Figure 2.1 CATEGORY OF BUILDING PROCUREMENT SYSTEMS(Source: Masterman J W E (1996) Building Procurement Systems: An Introduction)

- a) Separated and Cooperative Procurement Systems

2.4.1 Separated and Cooperative Procurement Systems

The unique characteristic of this category of procurement is the separation of the responsibilities for the design of the project from that its construction. Even where variants of the basic system allow co-operation between the contractor and the client or his consultants, these two fundamental elements remain as two separate entities. It is sometimes called linear or sequential contracting system or multiple responsibilities contracting approach. It is a system where the project development activities that start from feasibility study, preliminary design, documentation to construction and handover, are carried out sequentially one after another. Traditionally, the complete working drawings or design has to be prepared by the designers before tender and construction activities can take place. It is divided into 2 categories:

- a) The Conventional System
- b) Variants of the Conventional Systems.

a) The Conventional System

This method of procuring building projects is usually referred to within the industry and literature as _Traditional Method_ (Mastermann, 1992). Apart from the design and construction the conventional procurement system exhibits a number of other basic characteristics:

- 1) Project delivery is a sequential process
- 2) The design of the project is largely completed before work commences on site.
- 3) The responsibility for managing the project is divided between the client's consultant and the contractor and there is therefore little scope for involvement of either of the parties in the other's activities.

- 4) Reimbursement of the client's consultant is normally on a fee and expenses basis whilst the contractor is paid for the work completed on lump-sum basis.

The ideal definition of this method will include all of these features and the following attempt at encapsulation has been adopted for the purpose of use within this guide. The client appoints independent consultant on a fee basis who fully design the project and prepare tender documents upon which competitive bids, often on a lump sum basis are obtained from main contractors. The successful tenderer enters into a direct contract with the client and carries out the work under the supervision of the original design consultants.

Although it is the most practice procurement strategy in Middle east country but there are several advantages and disadvantages. The advantages are the design has been fully developed and uncertainties eliminated before tenders are invited, tendering costs are minimized, proper competition is ensured, the final project cost will be lower than when using the majority of other procurement methods and the selection of the bid that is most advantageous to the client will present difficulty.

Besides, the existence of a priced bill of quantities enables interim valuations to be assessed easily and variations to be quickly and accurately valued by means of pre agreed rates. The use of this method also provides a higher degree of certainty that quality and functional standards will be met than when using other systems.

In the other hands, this procurement strategy also have their disadvantages such as tenders are obtained on the basis of an incomplete design the bids obtained can only be considered as indicative of the final cost and the client is thud vulnerable to claims for additional financial reimbursement from the contractor.

Follow by the sequential; fragmented and confrontational nature of this system can result in lengthy design and construction periods, poor communication between clients and the project team and problems of build ability. Whilst the facility to respond to late demands for change, by introducing variations, can result in satisfied customers such action has been identified as one of the main causes of delay, and increased cost, and can lead to a permissive attitude to design changes.

Variant of the conventional systems differ only in the way in which the contractor is appointed, or reimbursed; all other aspect such as appointment by the client of a separate design team and cost consultant remain as for the parent procurement method.

Under the sequential method or a single stage tendering approach, the building owner will appoint a team of consultants to act on his behalf to produce construction drawings, specification and tender document and to administer the tendering processes to select a contractor. Once selected and awarded the contract, the contractor will carry out based on the drawings and specification prepared by the client's consultants.

The accelerated method can be considered as an innovative approach to speed up the selection of contractor and the commencement of construction. The method can be divided into 2 sub-categories i.e. two-stage and negotiated tendering methods. Both methods involve preliminary discussion with selected few contractors, submission of fixed tender and/or cost negotiation.

There Are 5 Variants of the Conventional System As Follow:

- i. Two-stage selective tendering
- ii. Negotiated contracts
- iii. Continuity contracts
- iv. Serial contracts

v. Cost reimbursable contract

i **Two-stage Selective tendering**

The Code of Procedure for Two Stage Selective Tendering (1983), points out that the term can be used to describe a variety of tendering procedures the most common of which is the system whereby the first-stage tender is binding and becomes the contract sum. This is in the opinion of the author, more properly modification of a single-stage tendering and the following discussion is therefore limited to the pure procedure which, as the title suggests, is made of two stages.

The process is similar to the parent system up to the time when tender documentation is produced. At this stage bills of approximate, or even notional quantities, or a schedule of rates are developed together with specifications and drawings, which are very often little more than sketches at this point.

A small number of contractors usually are invited to submit tenders based upon this approximate documentation and in some instances they are also asked to compete in other areas such as construction expertise, resources and site organization. The chosen contractor is then under an obligation to co-operate with the design consultants, giving advice on buildability, material ordering, costs, programming and detail design, such advice becoming a commitment.

Once the construction starts the project proceeds in a similar manner to that adopted on conventionally managed projects although the interim and final valuations and certificates will be determined as the result of a remeasurement of the work carried out by contractor in order to overcome the inaccuracy of the original approximate tender documentation.

The advantages of the two-stage selective tendering are saving in time can be achieved using this method and where overruns are experienced are usually shorter than in any other conventional method. However, the work commenced before a final tender sum is agreed and therefore early price certainty need to be secondary consideration and the client can be vulnerable to any change in the level of the contractor's pricing from that contained within the first-stage tender.

ii Negotiated Contracts

Here again the process up to the commencement of detailed design reflects the procedures adopted in the conventional procurement method at which time, when using this variant, it is possible to appoint a contractor early in the design stage either by assessing the experience, management expertise and competitiveness of a small number of appropriate contractors or perhaps more commonly on the basis of past performance and competitiveness of a single contractor on a repetitious similar or geographically adjacent project probably carried out for the same client. Only one contractor is restricted for negotiation method, the same process is followed with the price for the project being established on the basis of the bills of quantities, or the rates contained within the bills for the comparable project.

By using this method the modest savings in time can be achieved. The system also is useful where other procurement methods cannot attract sufficient tenders or realistic prices, where a special expertise is required or where project costs can be reduced as a result of the contractor already being established on site but a cost premium is invariably paid by the client when using this method and the project cost is thus nearly always higher than using other procurement systems.

iii Continuity Contracts

When using this variant contractors bidding for project on the basis of single-stage selective tendering are advised that the successful tenderer, subject to satisfactory performance, will be awarded a similar project to follow on from the completion of the first. The price for this subsequent project will be negotiated using the tendered rates included on the bill of quantities for the original project as a basis.

The characteristic of this procurement method are those that have previously been described for its two elements, i.e. the conventional system (single stage selective tendering) and a negotiated contract, although guarantee of continuity does generally result in a more positive commitment from both consultants and contractors on the first project.

The continuity contracts method gives a very competitive rates and tenders are obtained when using this method, the value and frequency of variations are lower than when using other systems and time overruns will be shorter than experience on projects managed by some other procurement methods but this system can only be used if there are at least two similar projects available within a defined geographical area which can be carried out sequentially and are capable of being to accommodate some flexibility in the timing of the commencement and completion of the second project. Besides, the client is committed to a second contract with no guarantee that the contractor will act, or perform, as he did on the first project.

iv Serial Contracts

In this method a number of projects, often referred to as a program with similar characteristics particularly in the case of building design are awarded to a single contractor following the receipt of competitive tenders based upon master bill of quantities. Although for a part of the same program, each project is

administered by means of a separate contract with the contract sum for each being calculated by using the rates priced in the master bill and the quantities appropriate to each project.

Serial contracts can consist of a number of projects either with individual start and finish dates or arranged with flexible timing to give continuity of work. Parallel working on different projects is quite common and has obvious advantages in term of saving in cost and time. This method was originally instigated by various central and local government bodies at a time when construction resources were in short supply in an effort to eliminate or at least reduce the inefficiency of allowing the knowledge and expertise of the project team that had been built up over the duration of a project to be dispersed as soon as the work was completed.

The serial contract approach is to avoids the need to dismantle experienced project teams after the completion of one project and allows their accumulated knowledge and expertise to be utilized on the other projects contained within the serial program with the result that the method has proved to be outstandingly successful in term of the usual performance criteria of cost, time and functionality. In addition, the tender prices are able to be reduced as

contractors are given continuity of work and the ability to bulk buy materials, particularly if the client's building program can be link to the large-scale factory production of components. This benefit can be even greater if

different clients take advantage of the opportunity this system offers to amalgamate their individual building program.

However this system can only be used if the client has a substantial and on-going building program where the individual projects are sufficiently similar in

design to enable a master bill of quantities and common tender documentation to be produced.

v Cost Reimbursable Contract

The Construction Industry Research and Information Association (1985) identified four main approaches to this variant are as follow:

- a) Cost reimbursable (cost plus) contract
- b) Target-cost contract
- c) Fee contract
- d) Management contracting

This approach is suitable where there is inadequate definition of the work at the time of tender, high inflation is prevalent, the project is extremely complex, there is a major or unquantifiable risk or when an emergency occurs, the use of this system can be advantageous to the client provided that a number of these characteristics are in combination within the one project.

In spite of that, the absence of the tender sum and estimated final cost generally precludes the use of this system on projects that are subject to rigid accountability requirements. There is no contractual commitment by the contractor to the final cost and no financial incentive for him to use his resources efficiently and although incentives can be incorporated to mitigate this difficulty, the fixing of targets requires very fine judgment.

a) Cost Plus Contracts

Under this arrangement a contractor is appointed, usually on the basis of competition on the fee element of the project only, to carry out the work defined by

the client's consults, with reimbursement being made by the payment of the actual cost of the works and a fee to cover the contractor's overheads and profit. The contractor's fee can be calculated in a number of ways as follow (Masterman, 1982):

- 1) A fixed fee, in the form of a lump sum based upon the estimated cost, varied only if the nature of the project changes dramatically
- 2) A percentage fee calculated on the final cost of the project
- 3) A percentage fee, related not to cost but to the estimated value of the project at the outset, updated by any variations that occur during the currency of the work.

b) Target-cost Contracts

This method differs from the basic cost reimbursable variant in two main aspects both of which affect payment. Firstly, a contractual agreement is reached either in competition or negotiation on a target cost for the work and a fee to cover the contractor's overheads, management costs and profit. Secondly, a procedure is agreed for sharing any savings or additions if the actual cost is lower, or higher than the target costs. This mechanism provides a financial incentive to the contractor which is absent from the basic method.

Perry et.al (1982) have pointed out that targets may be applied individually to the entire principle element for example cost time and functionality/ quality with the degree to which the target is met by the contractor being reflected in the eventual reimbursement received by him. It is also possible to set targets for two or all of the three elements and link them to form a combined target.

All of the systems making up the separated and co-operative category have one fundamental characteristic in common in that the responsibility for the two main elements of design and construction is vested in two separate organizations. In the variants contained within the co-operative subcategory this characteristic is

somewhat modified by the fact that all of the systems enable some organizations. In the majority of the variants this takes the form of the contractor contributing to the design of the project and giving advice on build ability, costing, material ordering, programming and etc.

2.4.2 Integrated Procurement Systems

There are number of advantages common to all of the methods included within the category of integrated procurement systems such as the single point of contract between the client and the contractor that is unique to this category of procurement systems means that the client has the advantage of dealing with one single organization that is responsible for all aspects of the project. Provided that the client's requirements are accurately specified certainty of final project cost can be achieved and this cost is usually less than when using other types of procurement systems. Besides, the use of integrated procurement systems enables design and construction to be overlapped and should result in improved communications being established between client and contractor. These two characteristics enable shorter overall project period to be achieved and project management efficiency to be improved.

However there are some disadvantages of integrated procurement systems for example which often happens, the client's brief is ambiguous and does not communicate his precise wishes to the contractor. Hence, great difficulty can be experienced in evaluating tender submissions and the absence of a bill of quantities makes the valuation and variations extremely difficult and restricts the freedom of clients to make changes to the design of the project during the post-contract period. Although well designed and aesthetically pleasing buildings can be obtained when using this category of procurement systems, the client's control over this aspect of the project is less than when using other methods of procurement. The integrated procurement systems consist of package deal, turnkey method and develop and construction. Each is discussed in detail in the next sections.

2.4.3 Design and Build

This system, as the name implies, integrates or combines the responsibilities of design and construction of the project (Ashworth, 2001). Both responsibilities are contracted out to a single contracting organization. It is also called a parallel or single responsibility procurement system whereby the client will only need to deal with a single organization for both the designing and constructing the proposed project.

In this case, the contractor will have to engage and be responsible for design and construction teams. Design and build system falls under this category of project procurement system. Under this system, the client together with the consultants will prepare a tender or bidding document that include the project brief and client's requirements and invite a number of contractors to bid. For the purpose of submitting

tenders, the invited contractors will produce their own design, construction and cost proposal. Very often the successful contractor enter a contract based on lump sum price and a fixed duration (Ashworth, 2001; Edmond, 2003). Figure 2.2 shows the relationship of design and build.

The disadvantages of this system are the performance of design and build contractors is subject to considerable variation dependent upon whether they are pure, integrated or fragmented organizations and levels of technical and managerial

competence are likely to be lower as the client's choice moves from the first through the second to the third type of contractor. This due to the difference in capability between an organization type of contractor as a route of the difference in capability between an organization specializing in design and build with in-house resources covering all disciplines (pure): a general contractor with partial in-house expertise (integrated); and a minimum/ small builder in consortium with an external design team (fragmented) Conversely, project costs are likely to increase as the

client's choice moves from fragmented through integrated to pure design and build organization.

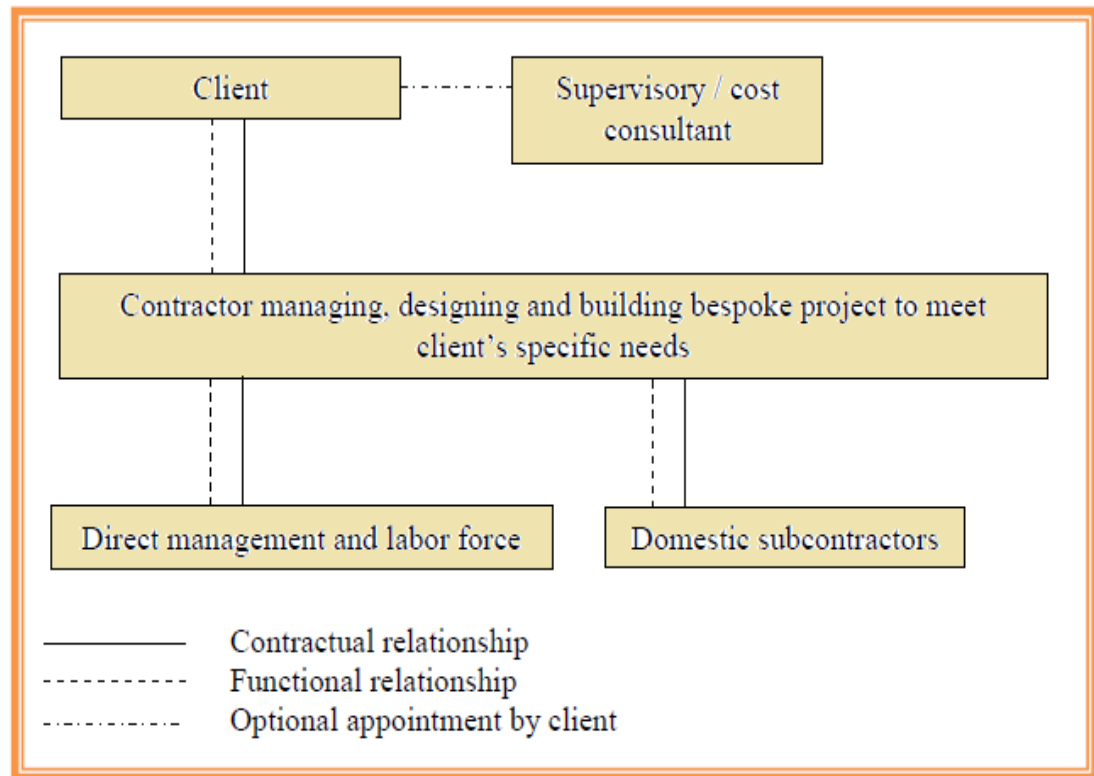


Figure 2.2 Contractual and functional relationship for design and build

The variation or innovation to this mode of project delivery systems includes:

- a) Package deal
- b) Turnkey method
- c) Develop and construct

a) Package Deal

This system that entail the contractor to be responsible for both the design and construction of the project, allows for the early start of construction through the reduction of the pre-tender activities as such they reduce process time. Package deal

or commonly called the "all in" contracting is a type of procurement method where a contractor is given the responsibility for everything that is required and necessary for the design, construction and delivery of the project.

The fundamental difference therefore between the design and build and package deal is that the former method provides a bespoke design solution to suit the client's specific requirements whilst the latter uses a proprietary building system in order to produce a scheme which is unlikely to satisfy all of the client's needs.

Figure 2.3 illustrates the system and the various relationships between members of the project team. Provided that the purchaser's requirements are flexible, this method can be an attractive proposition particularly as the probable reduction in the design, approval and construction stages of the project can lead to savings in the time and cost.

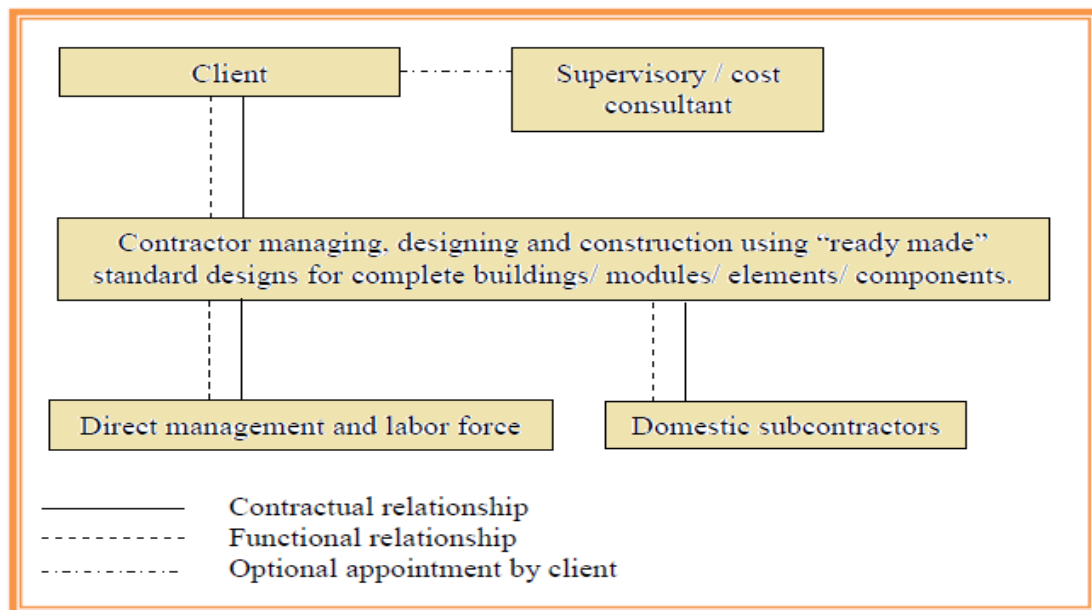


Figure 2.3 Contractual and functional relationship for package deal

The majority of package deal contractors by their very nature, employ their own in-house designers and can thus be categorized as pure design builders and as

such be expected to perform well particularly in terms of the speed and time criteria. Some of the products of this method lack aesthetic appeal but as the potential client is often able to see actual examples of the contractor's product before reaching a decision, this potential difficulty can often be avoided.

In all other respects the package deal replicates the characteristics of the design and build system, although the form of contract used with this method are likely to be contractor- drafted, rather than any of the nationally recognized standard forms and great care therefore needs to be taken by clients if this type of document is to be used.

The advantages of this system are the client is usually able to see actual examples of the package dealer's product in real situations and assess their practical and aesthetic appeal and many proprietary systems have been tried and tested over a period of years and are thus likely to be free of the initial constructional defects which affect some bespoke projects.

However the disadvantages of this method included uses of the proprietary building systems to produce schemes which may not satisfy all of the client's needs. Some serious structural failures have occurred among some of these proprietary systems, which have also suffered from other less serious defects as a result of poor design and detailing.

b) Turnkey Method

Under this system, the services of the contractor will include the preparation of project brief, sketch and final working drawings, getting all the approval from authorities, project financing, and construction, furnishing and commissioning of all equipments and accessories and handing over the project to the client. Turnkey contract is an American term for "all in" or package contract.

Under this arrangement, a contractor is commissioned to undertake the responsibilities for everything necessary and required for the construction, completion, commissioning and hand over the project. The word "turnkey" means that, upon completion, the client is given the key and he can then enter the project by "turning the key". The contractor will have to do everything from preparing project brief, getting approval, designing, financing, construction, furnishing and decorating to commissioning and handing over completed, cleaned and ready for use project (Allen, 2001).

The responsibility of the contractor is thus when using this variant often extended to include the installation and commissioning of the client's process or the other equipment and sometimes the identification and purchase of the site, recruitment and training of management and operatives and the arranging of funding for the project as illustrated at Figure 2.4.

The advantage of this system is the client is able to operate the facilities and commence production immediately as he takes possession of the project.

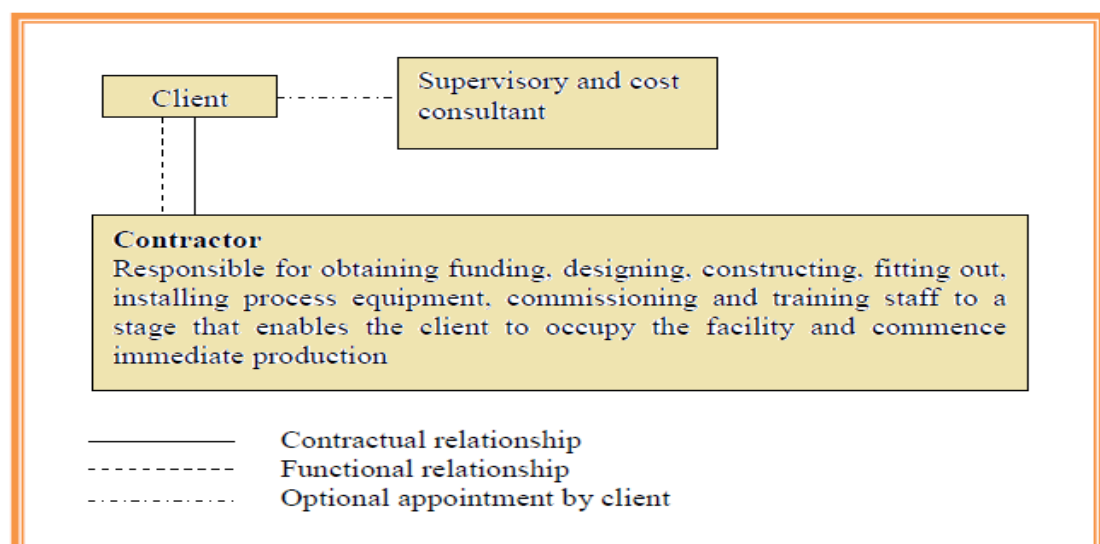


Figure 2.4 Contractual and functional relationship for turnkey system

c) Develop and Construct

Develop and construct is another form of the integrated procurement approach which is very much similar to design and build. In this case, the contractor is still given the responsibility for both the design and construction of the project. The difference is that, under this method the client's design consultants prepare the concept sketches or designs and passed them to the contractor who will develop them and produced the detailed working drawings. The contractor will then construct and complete the project based on what it has developed and produced. This is illustrated in Figure 2.5.

It is thus apparent that the main difference between design and build and this variant is that the extent to which the design of the project has been developed at least up to outline planning stage and may in sensitive planning location be taken to the point where full planning approval could be obtained.

This system is useful where the client has his own in-house design expertise, regularly uses external designers and sees advantages in retaining the or the client wishes to restrict the knowledge of his intention to build or wants to minimize the difficulties of comparing disparate design and build submissions, while at the same time requiring a single organization to take responsibility for the detailed design and construction of the project.

In the other hand, the responsibility for the design of the project can be possible area of dispute when using this system due to the involvement of both the design consultants and the contractor in this aspect of the project.

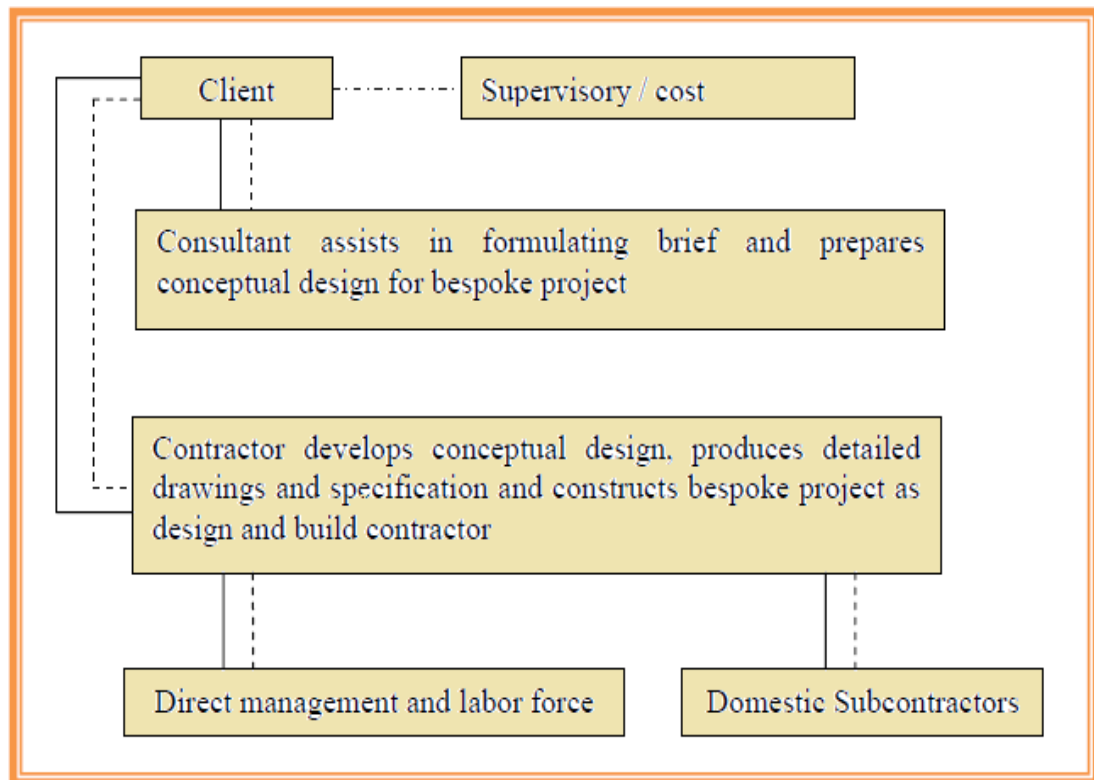


Figure 2.5 Contractual and functional relationship for develop and construct

From the above discussion, it can be seen that one common fundamental characteristic of integrated procurement systems is the responsibility for the two main elements of design and construction is vested in one single organization. Through this system the communication between each party is improved and increased the project performance.

2.4.4 Management Oriented Procurement Systems

It is a system that gives greater emphasis on the management and integration of the design and construction of projects. Under this system, the management of the design and construction a project is contracted out to a contractor who acts as a management consultant on behalf of the client. The construction itself is

commissioned to many "specialist" or sub-contractors who enter into contract with either the management contractor or the client.

This procurement approach that was introduced based on the conception that a builder or contractor has more expertise to manage the design and construction of a project. As management consultant, the appointed contractor does not itself, carry out the design or construction of the project. The main responsibility is to manage the design and construction by the design consultants and the many specialist contractors, respectively.

There are three types of procurement method that fall under the category of Management Oriented Procurement Systems, which are:

- a) Management contracting
- b) Construction management
- c) Design and manage

Management contracting and construction management contracting are forms of "fast-tracking" procurement approach where by a contractor is contracted and paid a fee to manage, procure and supervise the construction of a project rather than to build the project. The actual construction works are contracted out to many package or specialist contractors.

Under this arrangement the management contractor is employed as a construction consultant to be part of the client's team. The main difference between contract management and construction management contracting is that in the former, the package contractors are in contract with the management contractor. In the latter, the package contractors (specialist sub-contractors) are in contract with the client or building owner.

The advantages of this system are the use of this category of systems enables commencement of the project to be accelerated which in turn should enable earlier completion to be achieved than when using procurement systems in the separated or cooperative categories. Earlier advice can be obtained from the contractor/ manager on design, buildability, programming materials availability, together with general construction expertise. The system within this category has a high degree of flexibility to allow for delays, variations and rescheduling of work packages. As when using the systems within this category the financial structure of the project is fragmented, the monetary failure of any works contractor will only have a limited effect on the total process. The use of individual work packages to carry out all construction work ensures that competition can be achieved on up to as much as 90% of the construction cost of the project and makes it possible to adjust the cost, or scope of uncommitted work should the packages already awarded have exceeded their estimated cost.

However the disadvantages are the fundamental aim of this category of procurement system is the elevation of the contractor to the status of a client's adviser/ consultant with the result that the contractor's contractual liabilities which are limited in the same way as other members of the professional team to accepting responsibility for any negligence in the performance of his management function. All of the systems within this category allocate the majority of the project's risks to the client. These can be particularly onerous where works-package contractors fail to perform and affect following and parallel operations which will affect the overall project performance.

Although the contractor is responsible for supervising construction and ensuring that work is built to the standards identified by the design team, the fact that his obligations are limited to his management performance means that the client is liable for cost of remedying any defects resulting from the substandard performance of any works contractor who is resulting from the substandard performance of any works contractors who is unwilling or unable to rectify his own fault.

The whole question of maintaining quality control is problematic when using the procurement systems within this category and the client may therefore need to appoint additional site supervision to avoid difficulties in determining the responsibility for defects and to ensure that the specified quality standard is achieved.

The client does not have firm price tender available before commencing work although both private and public accountability can be partially satisfied as the majority of the construction cost can be subject to competitive tender.

There are three (3) classes of management oriented procurement systems which included as follow.

- a) Management contracting
- b) Construction management
- c) Design and manage

a) Management Contracting

The main characteristic of this procurement system are as following:

1. The contractor is appointed on a professional basis as an equal member of the design team providing construction expertise
2. Reimbursement is on the basis of a lump sum or percentage fee for management services plus the prime cost of construction
3. The actual construction is carried out by works or package contractors who are employed, co-ordinate and administered by the management contractor

Many definitions of the method exist but all contain, in part at least, these fundamental features. For the purposes of this guide the following definition has been adopted (Masteman, 1982):

" Management contracting is a process whereby an organization, normally construction based, is appointed to the professional team during the initial stages of a project to provide construction management expertise under the direction of the contract administrator."

"The management contractors employ and manage works contractors who carry out the actual construction of the project and he is reimbursed by means of a fee for his management services and payment of the actual prime cost of the construction." The functional and contractual relationship for Management contracting is illustrated in Figure 2.6

A variant of the pure system enables the client to obtain from the management contractor a guarantee maximum price (GMP) for the construction elements of the project. This method is perceived as allowing accelerated project progress and completion but the results of research are somewhat ambiguous in this respect and it can only be concluded that the risk of delay is reduced and that time targets are unlikely to overrun.

The disadvantages are where a GMP is obtained the management contractor's status as the client's adviser is jeopardized and there can therefore be the real possibility of a conflict of loyalty. Current research indicates that the project costs incurred when using this system are higher than those generated in conventional or design and build systems. This situation results mainly from high tenders submitted by works contractors.

As a result of onerous contract conditions and high levels of risk imposed by management contractors and the duplication of management and common services costs brought about by the presence of both the management contractor's and package contractor's site organizations.

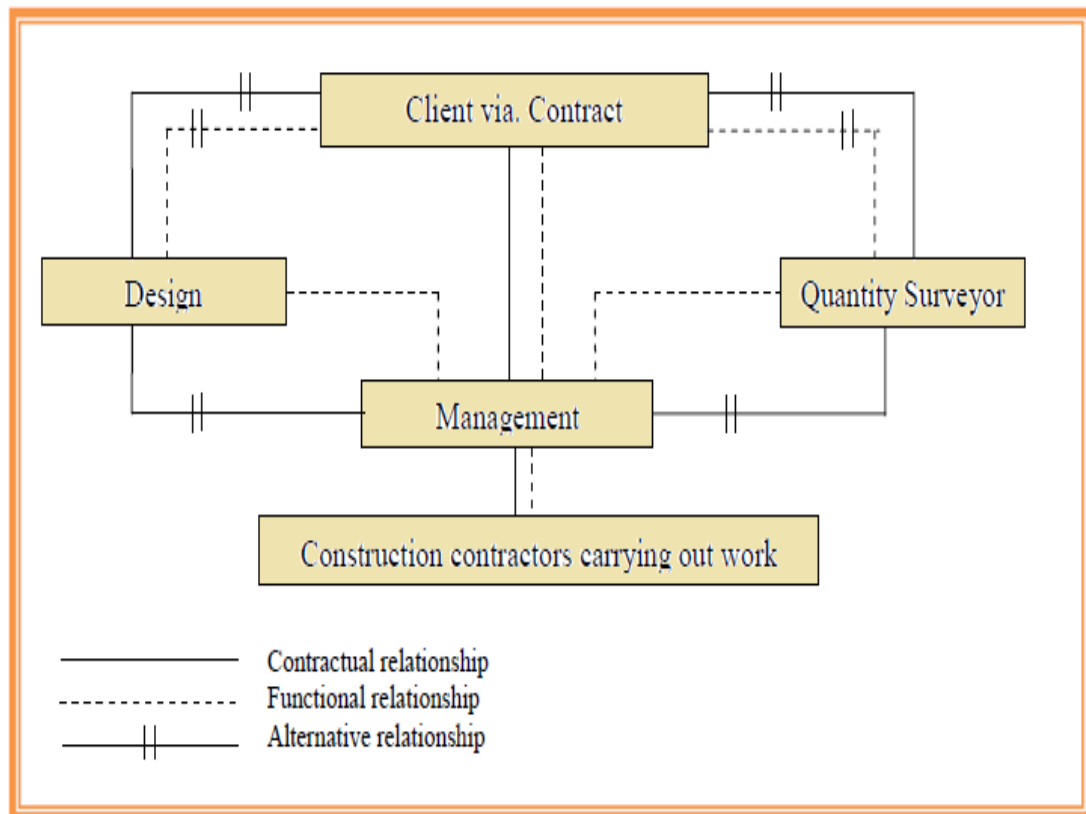


Figure 2.6 Contractual and functional relationship for management contracting

b) Construction Management

NEDO's customer's guide to using the construction industry, Thinking about Building (1985) defines this system as the method where the management service is provided by a fee-based professional and all construction contracts are directly between the client and the trade (package) contractor. It will thus be seen that the fundamental difference between this procurement system and management contracting which are confusing is the approach of the client enters into a direct contract with the individual work contractors. The construction manager then acts as the employer's agent when dealing with each of the separate contractors.

The main Characteristic of the System Are as Follow:

1. The construction manager is appointed as a consultant during the initial stages of the project and has equal status to the members of the design team.
2. Reimbursement is made by means of a lump sum or percentage fee for management services.
3. The physical construction of the project is carried out by works, or package, contractors who are employed by the client and co-ordinate, supervised and administered by the construction manager.

For the purpose of this guide the construction management system has therefore been defined as (Masterman, 1982):

"The construction manager adopts a consultant role with direct responsibility to the client for the overall management of the construction of the project, including liaising with design consultants, to meet agreed objectives. "

"The construction manager is reimbursed by mean of a professional fee and all construction is carried out by means of works packages which are the subject of direct contracts between the client and the package contractors. "

This method if correctly applied can result in a more constructive and positive attitude being exhibited at management, supervisory and operative levels. The fact that the client enters into direct contracts with individual works package contractors enables a high level of immediate cost control to be achieved and also ensures that the works contractor's cash flows are improved as a result of receiving direct payments from the client, rather than through an intermediary. The client's increased involvement in the management of the project when compared to other methods, promotes better working relationship within the project team.

But the nature of this system requires the client to be deeply involved at all stages of the project to have sufficient in-house expertise enable the coordination of the activities of the construction manager and the designer consultants. This also enables the additional administrative duties and responsibilities inherent in the system to be accommodated. The present position on fees is confused as the construction manager's responsibilities vary from project to project and the division of reimbursement into a percentage fee and a lump sum for the provision of common site services can jeopardize the construction manager's status as the client's consultant and lead to a conflict of loyalties.

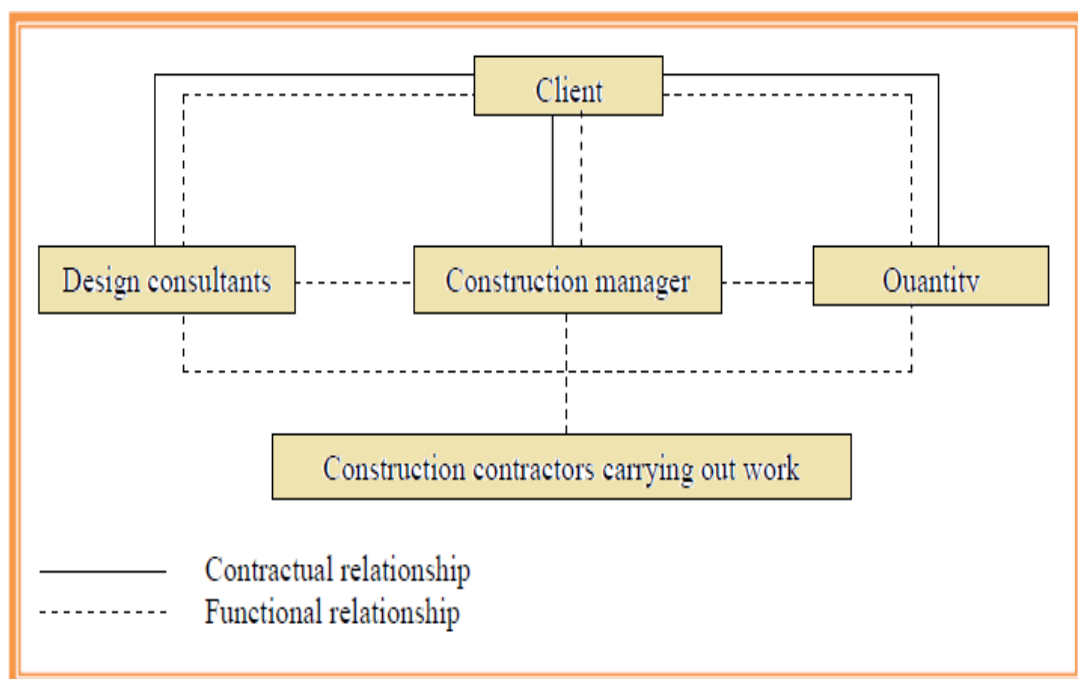


Figure 2.7 Contractual and functional relationship for construction management

c) Design and Manage

Under the design and manage system, a single organization or firm is commissioned to be responsible for designing the project and managing its construction. The firm does not carry out the work itself, but it is contracted out to a number of specialist sub-contractors or package contractors, who enter into contract with the client. A design and manage firm or company is engaged as a consultant for the client and become a member of the project team.

The Main Common Characteristics of the System Are Therefore:

1. A single organization is appointed to both design and manage the project.
2. The single organization can either be a contractor or a consultant.
3. The actual construction of the project is carried out by works, or package contractors who, in case of the contractor variant, are employed by the contractor when using the consultant variant the works contractors are directly employed by the client.

Thus the design and manage system can be defined as:

"The design and manage organization acts as a consultant, normally with direct responsibility to the client for the design and construction of the project. All construction is carried out by means of works package, which are either the subject of direct contracts between the client and the package contractors, or contract between the design and manage organization and the package contractor. " In the former, variant reimbursement is by means of a professional fee and the latter by means of a fee together with the actual cost of common services and work packages.

In this arrangement the client plays an active role in the procurement system by entering into separate contracts with the designer (architect or engineer), the

construction manager, and individual trade contractors. The client takes on the contractual role, while the construction or project manager provides the active role of managing the separate trade contracts, and

ensuring that they all work smoothly and effectively together. Management procurement systems are often used to speed up the procurement processes, allow the client greater flexibility in design variation throughout the contract, the ability to appoint individual work contractors, separate contractual responsibility on each individual throughout the contract, and to provide greater client control.

2.5 The Process of The Various Procurement Systems

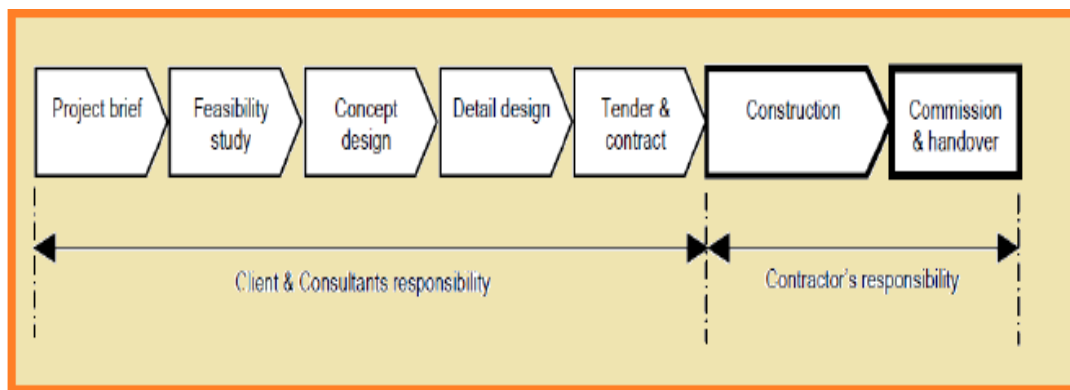


Figure 2.8 The Linear or Sequential Process of the Traditional Procurement System

It is appropriate at this juncture to view the processor flow of activities of the different procurement systems. They have, to a certain extent, indicated the effect of the different procurement system on the project performance, specifically on the duration of the project development and the starting point of the construction. They also show the allocation of duties and responsibilities between the client, design and construction consultants and contractor's.

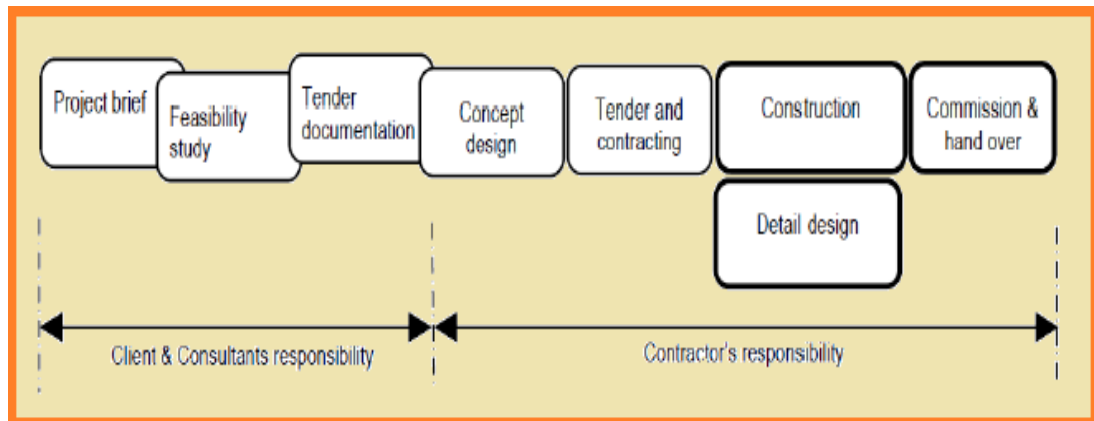


Figure 2.9 The Integrated Process of Project Designing and Construction in the Design and Build Procurement System

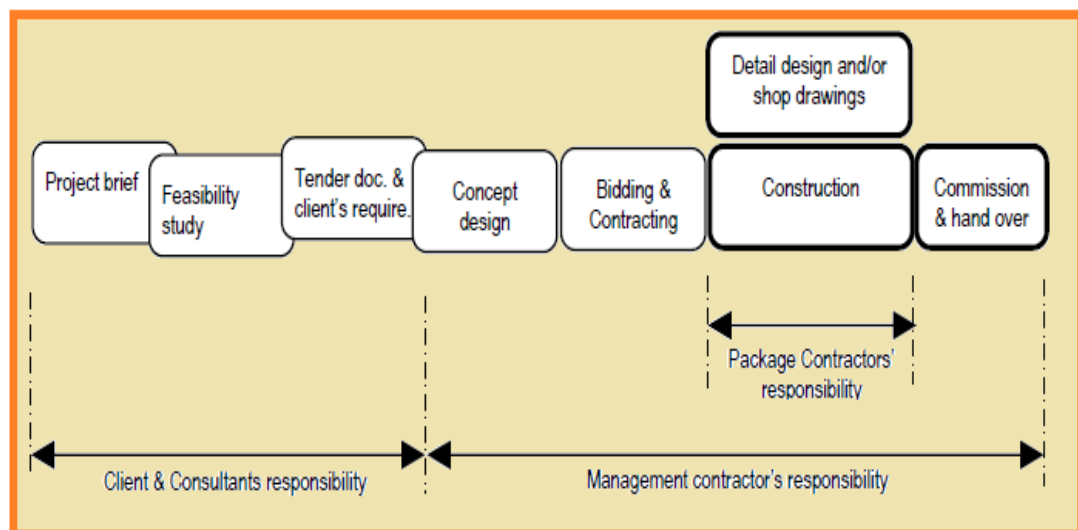


Figure 2.10 The Process of Project Designing and Construction in the Management Contracting & Professional Construction Management Procurement System

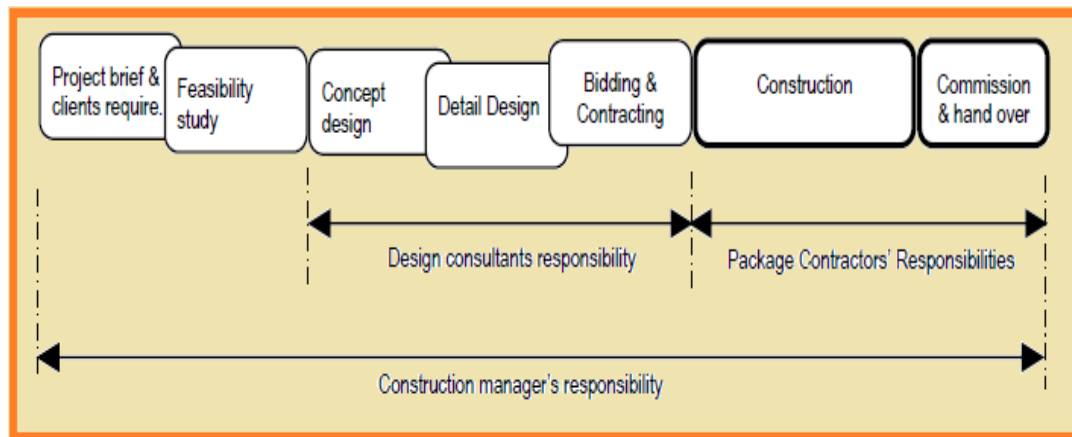


Figure 2.11 The Process of Project Designing and Construction in the Design and Manage Procurement System

2.6 Criterion in Procurement Selection

Selection criteria are closely linked with project objectives, both tangible, such as time and cost, and intangible, such as build ability and relationship. The selection criteria were established by reviewing previous studies and then selecting those criteria that are relevant to the Hong Kong practice. A comprehensive list of clients, requirements can be found in the work of Bennett and Flanagan (1983). Hewitt (1985) carried out a survey of 21 clients and identified four "real needs." These are:

1. Certainty of cost and time
2. Flexibility to change design in the construction stage
3. Desire to be actively involved
4. Innovative inputs consultants

Findings as reported by Masterman and Gameson (1994) highlighted the pragmatic view of clients. In their study, certainty in time, cost, and achieving value for money were identified as the primary concerns of construction clients. Other procurement selection models (HMSO 1985; Skitmore and Marsden 1988; Franks

1990) had used similar selection criteria, although with some minor differences. Table 2.1 summarizes the selection criteria used in previous studies.

Table 2.1 Comparisons for Procurement Selection Criteria

Reference	Criteria for procurement selection
Bennet and Flanagan (1983)	Speed; certainty; flexibility; quality level; complexity; risk avoidance; price competition; accountability
Hewitt (1985)	Certainty; flexibility; accountability; innovative; input from consultant
Masterman and Gameson (1994)	Certainty; price competition; accountability
HMSO (1985)	Speed; certainty; flexibility; quality level; complexity; risk avoidance; price competition; responsibility; disputes and arbitration
Skitmore and Marsden (1988)	Speed; certainty; flexibility; quality level; complexity; risk avoidance; price competition; responsibility; disputes and arbitration
Franks (1990)	Complexity; price competition
Note: Criteria used in this study were speed; certainty; flexibility; quality level; complexity; risk avoidance; price competition; and responsibility.	

Seven selection criteria were selected which primarily concerns of construction clients in Middle East Country are mainly related to time, cost, and quality as these will directly affect their profit margins. Dispute and arbitration are to be avoided. Because of cultural characteristics, the number of disputes that needs to be resolved through arbitration is not many.

Accountability is an issue for public projects and less important for private developments. Innovative inputs from consultants are always welcomed, yet this is usually achieved through other channels rather than resulting from a certain procurement option. The seven selection criteria used for this study are:

1. Speed: The time taken to complete the project
2. Certainty: The certainty over the cost for completion of the project
3. Flexibility: The ability and authority for the client to effect changes
4. Quality level: The quality level required of the completed project
5. Complexity: The suitability of the procurement method to tackle complex project
6. Risk avoidance: The transfer of risk to the contractor
7. Price competition: The degree of price competition pertaining to the procurement options

2.7 Definition of Competitiveness

Shen, et al. (2006) defined competitiveness as the ability of organization's to compete for business in various markets. Company competitiveness is defined as the ability to design, produce, and (or) market products superior to those offered by competitors, considering the price and non price qualities (Momaya and Selby, 1998). The U.S. Competitiveness Policy Council (1992) [cited in (Lu, et al., 2008)] defined competitiveness as the ability to produce goods and services that meet the test of international markets while citizens earn a standard of living that is both rising and sustainable over the long run. Drew and Skitmore (1993) defined contractor bidding competitiveness as a percentage of the difference between concerned contractor's bid and the lowest bid among all bidders to the lowest bid. Flanagan, et al. (2007) defined company competitiveness as the ability to design, produce, and (or) market products superior to those offered by competitors, considering the price and non price qualities.

2.8 The Construction Industry and the Competitive Environment

It is not the end desire of the clients to obtain reasonable number of bids, but the most important objective that is integrated strongly with the participation process is to achieve the competitive bids that satisfy the clients' requirements and needs. At the same time, not all the bidders participate strongly to compete, some of the bidders participate to add their name for the client list or to mislead the other competitors in the next tenders. These discussions reflect that the competitiveness environment is integrated strongly with the bidders' participation process (El-Karriri, 2008).

The nature and form of the competitive arena for the contractor in construction contracting is largely determined by the client and/or advisors. The choice of bidding system coupled with bidder selection practices has a direct bearing on the degree of competition since it affects both the number and identities of bidders competing for a particular contract. An addition in the number of bidders above four or five has only a marginal impact on competitiveness (Drew and Skitmore, 1997).

The identities of individual bidders are important since different bidders achieve different levels of competitiveness. Examined the implications of a random prequalification procedure in which it was shown that identification of the most competitive bidders was a crucial missing factor Skitmore (1981) [cited in Drew and Skitmore, (1997)].

Introducing Competitiveness to the Competitive Bidding Practices

With the development of multi-criteria selection in competitive bidding practices, some researchers (e.g. Flanagan, et al. 2007; Drew and Skitmore, 1993, 1997; Shen, et al., 2004, Fu et al., 2003) adopted the concept of competitiveness to represent a contractor's overall capacity to compete for a project. They contend that competitiveness is a more informative concept to synthesize various ideas arising from the competitive bidding (Drew and Skitmore, 1993; Shen et al., 2004).

Construction projects should be granted in line with highest competitiveness rather than lowest price. The former is supposed to ensure the overall success of a project since it examines the wider scope of a contractor who is going to construct the project. The major

contribution of these studies is that they introduced the concept of competitiveness into the competitive bidding practices while maintaining the consistency with the propositions of those multi-criteria bid evaluations. Several typical studies on competitiveness at the project level have been observed. Inspired by Flanagan and Norman's (1982a, 1982b, 1985) (cited in Flanagan, et al. 2007). Early assertions that contractors' competitiveness varies according to project attributes such as type and size.

Drew et al. published several papers in this topic. They examined the relationship between the competitiveness of contract bids entered by individual bidders through the variables of bidder size, contract value and project type (Drew and Skitmore, 1993). The effect of contract type and size on competitiveness for a project is investigated by using multiple regression (Drew and Skitmore, 1997). Later, their research expanded the scope from the contract type and size to client types and experiences of contractor, and examined competitiveness when these attributes are different (Drew et al., 2001; Fu et al., 2003).

Furthermore, research suggests that a contractor's competitiveness for a project should be assessed not only by considering its commitments specified in the tender, but also by assessing its previous experience and current capacity (Flanagan, et al. 2007). In addition, Shen et al. (2004) propose that assessment of competitiveness for a project should take into account the characteristics of the local market. Business environment is a key variable for determining competitiveness for a project. While acknowledging that a contractor's competitiveness varies according to project attributes (Drew and Skitmore, 1992, 1997), further purport that competitiveness in relation to a given project also presents different levels by allocating a firm's own resources such as money, manpower and plant. In summary, competitiveness at the construction project level refers to a contractor's capacity to compete

for a project. It enables a contractor first to win the contract and secondly to undertake that project successfully. Clearly, competitiveness for a project stems from the competitive advantage possessed by a firm. However, competitiveness for a project varies according to project attributes such as type, size, and so on. Competitiveness for a project also depends on the competitive strategy a contractor adopted to compete for that given project (Flanagan, et al. 2007).

Competitive Bidding in Construction

Williamson et al. (2004) stated that the origin of construction tendering in UK dates back to the early eighteenth century, where it was used for the procurement for barracks during the Napoleonic wars. It remains more or less unchanged today. Even in its infancy, the construction tendering process was believed to impose both probity and competition on tenderness. Later, the tendering process was further developed and adapted by the British Civil/Construction industry as the process to ensure that keen competition among tenderers was reflected in the outcome of the process. Submitting bids, or bidding, for construction contracts is the life blood of a construction company. The first step towards being awarded a construction contract is participating in a competitive bid (Pannell and Murphy, 1994).

Competitive bidding, where the project is awarded to the lowest bidder, is a basic part of the construction industry. This method of project delivery is designed to promote healthy competition in an attempt to ensure the lowest price for the project. While private owners may choose to award contracts in any way, many public agencies are required by law to award the project to the lowest bidder, (Sparks, 1999).

In competitive bidding, an owner invites a selected number of contractors to compete for his/her project. Upon reception of the invitation, a selected contractor must decide on whether to accept or decline it. If the invitation is honored, the contractor will prepare and submit a tender price. The submitted price is an offer which is binding upon the owner's acceptance (Shash, 1993). The business of many organizations is based on performing contract work obtained by submitting winning bids to client organizations in competition with other contractors (Chapman et al., 2000).

Ngai et al. (2002) emphasized that one of the major problem facing construction clients is how to obtain competitive bids for their projects in a cost effective way and at the same time maintain its public accountability. Strategically, some bidders may place a high bid to signal to their competitors that they have no interest in the market and expect the competitors to likewise signal back that they have no interest in other markets. They may also place a high bid in one period with the intention to present a much more competitive bid in a later period. It could be argued that a high bid, although not successful, may change the expectations of the competitors and drive up the price level in later tenders. Another strategic motive for handing in a high bid is that a firm wants to demonstrate a continuing market presence to the public agency (Alexandersson and Hultén, 2006).

Skitmore, (2002) considered non competitive bids that are upper 20 percent of bids, excluding the highest two bids of the auctions and excluding the bids that are exceeding six times the average bid respectively. Skitmore (2002) concluded also from his study that, the construction contract auctioneers are advised to treat bids

over 1.47 times the standard deviation above the mean value of the bids as being non-competitive. The important aspect that should be considered by clients, consultants and decision makers in construction projects

is how to strength and support bidders capabilities and core competencies to sustain in the business and to be competitive. According to Assaf et al.(1998) there are two types of competitive bidding, open and closed. In open bidding, all contractors use the same proposal form that is provided with the bidding documents, and the bids are opened publicly to preclude accusations of favoritism. In closed bidding, no prescribed proposal form is used, and there is no public opening of bids. Public contracts usually advertised and let according to bidding statutes. Contractors who are interested in obtaining the project submit bids to the owner at set time. The project is then awarded to the lowest responsive and responsible bidder.

The usual format of the bidding process is that fixed-price bids are invited for a specified piece of work, and the contractor submitting the lowest bid is awarded the contract. On this basis the client's decision is relatively straight forward, but the contractor's decision on what price to bid is more difficult (Chapman et al., 2000).

The final bids are normally submitted on either a lump sum or unit price basis, as stipulated by the owner. A lump sum bid represents the total price for which a contractor offers to complete a facility according to the detailed plans and specifications. Unit price bidding is used in projects for which the quantity of materials or the amount of labor involved in some key tasks is particularly uncertain.

Recently there has been a trend toward project delivery methods other than competitive bidding. For example, the industry is showing increased interest in design-build contracts. Another method of awarding projects, which is growing in popularity, is the average-bid method (Sparks, 1999). Bidding low in the face of competitors increases the chance of winning the contract but reduce profitability. However, bidding at a level which ensures a good return increases the chance that a

competitor will win the contract by submitting a lower bid. The problem is aggravated by difficulty encountered in estimating the probability of winning with a given bid, and by uncertainty about the costs involved in performing the contract (Chapman et al., 2000).

Drew et al., (2001) stated that the contract bidding is a well established mechanism for achieving distribution of work to willing contractors and is concerned with contractors making strategic decisions in respect of: (1) the selection of contracts to bid for and (2) the bid levels necessary to secure them. If a contractor opts to bid, the pricing of the bid normally comprises a two-stage formulation process consisting of a baseline cost estimate and subsequent mark-up for example, overheads, profit and risk.

2.9 The Typical Competition Strategies

Many research works have been done to investigate various competition strategies in the construction market. Tan et al., (2008), and Kumaraswamy et al., (2000) classified competition strategies into five types which are:

2.9.1 Lower Bid Strategy

By adopting a lower bid strategy, the contractor will offer a much lower bidding price than other competitors in order to increase the chance of winning the contract. On the other hand, it should be noted that the adoption of this strategy is in sacrifice of the contractor's profit margin (Tan et al., 2008).

2.9.2 Joint Venture Strategy

Adopting a joint venture strategy to compete in the construction market means that several contractors form a joint organization to tender for a contract. Since the construction projects are becoming more complex and risky, there is increasing demand for contractors with diverse strengths and weaknesses to form joint ventures to collectively bid for projects (Kumaraswamy et al., 2000).

2.9.3 Public relations strategy

Public relations are the practice of managing the communication between an organization and other stakeholders in the construction market. The public relations strategy is used to help contractors in communicating effectively and positively to the public, to clients and to consultants. The communication can be in different ways, such as by attending conferences, winning industry awards or establishing long-term cooperation with clients. The strategy will help improve the contractor's image, thus increasing the chances of winning in competitions in the market. (Tan et al., 2008).

2.9.4 Risk Control Strategy

Risk control strategy in the completion is considered one of the means to assess and manage the risks related to a project. Contractors can demonstrate that they have the best skill in risk control if they adopt the proper strategy. Thus they can gain better credits from clients. The risk control strategy includes avoiding the risk, reducing the effects of the risk, transferring the risk to other parties, or accepting the consequences of a particular risk(Tan et al., 2008).

2.9.5 Claim Strategy

The claim strategy is used when the expectation is that there are potential changes in the design of a project, or there are uncertainties existing in the project which may lead to claims in the future. The adoption of this strategy depends on the characteristic of the project. For example, a small project with a detailed design is not appropriate for selecting this strategy, but a large complex project without a detailed design may be a good choice for implementing this strategy (Tan et al., 2008).

Procedures for Identifying Critical Success Factors for Competitiveness of Contractors

Despite the wide acknowledgment of the CSF approach in previous studies, no fixed rule has been developed for the identification of CSFs. However, some studies (e.g., Chau et al. 1999; Shen and Liu 2003) have adopted systematic procedures for this purpose. The typical procedures proposed in these studies can be summarized and presented as the following five steps:

1. identify a full set of selected success factors (SSFs)
2. conduct a survey to investigate each SSF's importance by referring to a given goal
3. calculate each factor's importance index value based on the survey data
4. extract CSFs from the pool of SSFs according to the value of importance index;
5. interpret and analyze the extracted CSFs.

The rationale behind these steps is that, as suggested by Chau et al. (1999), experienced practitioners involved in a particular field would have identified a set of CSFs. Researchers then present a full coverage of success factors to these experts

and ask them to rate the importance of these factors. Based on the experts' opinions, the vital success factors can be identified through a certain analytical process. At the same time, the number of success factors will be reduced as noncritical factors are excluded. Several studies (Chau et al. 1999; Shen and Liu 2003) have demonstrated the effectiveness of this opinion survey methodology. This approach is particularly effective when factors cover many qualitative items such as management efforts for which hard performance data are not available. The effectiveness of this approach has convinced the writers to adopt a similar methodology for identifying the CSFs in the Chinese construction market.

Contractor Competitiveness Indicators

A typical method for assessing contractor competitiveness is to calculate a competitiveness value that is considered a function of several competitiveness indicators. The identification of contractor competitiveness indicators has been extensively covered in previous studies.

The study by Holt et al. (1994) classifies competitiveness indicators under five groups: contractor's organization, financial considerations, management resource, past experience, and past performance. Each group includes various specific indicators. Hatush and Skitmore (1997) proposed a set of alternative criteria classified into five categories for assessing contractor competitiveness, including financial soundness, technical ability, management capability, health and safety, and reputation. Nevertheless, these works are criticized, for example, for lacking consistency. The study by Lam et al. (2000) presents an artificial neural network as a decision support tool for pre-qualifying contractors through examination of the multiple contractor competitiveness variables including technical strength, financial status, etc.

Shen et al. (2006) identified a proper method to assess contractor competitiveness indicators in the current Chinese construction market, and KCIs are

identified for different types of construction projects. The identification of KCIs provides valuable information for helping contractors to prepare themselves effectively when they consider competing for works in the Chinese construction market. Contractors are advised to give more attention to these key indicators by which their competitiveness is measured. The research results are also useful for project clients to consider choosing proper indicators for assessing contractors' competitiveness.

Henricsson and Ericsson.(2005) suggested the Key Competitiveness Indicators (KCIs) to be used to measure the competitiveness of a construction industry in Sweden. the Key Competitiveness Indicators are profitability, productivity , time predictability, cost predictability clients' satisfaction with the value for money on delivered products and services, wage levels, work conditions, labour attractiveness, business ethics environmental consciousness, and Innovativeness.

Tan et al. (2007) studies the key competitiveness indicators (KCIs) for measuring contractors' competitiveness in the Hong Kong construction industry. The identified KCIs will be useful to help contractors to understand their strengths and weaknesses, thus improve the effectiveness of formulating competitive strategies in competitions. classifies competitiveness indicators under six groups: which are Indicators measuring technical ability, indicators measuring corporate Image, indicators measuring technical ability, indicators measuring financing ability, indicators measuring marketing ability, and indicators measuring human resource skills.

Categorization of Factors Affecting Contractors' Competition

The identification of contractor competitiveness indicators has been extensively covered in previous studies. The study by Carr and Sandahl (1978) [cited in Tan et al., (2009)] considered that the factors affecting the bidding decision

could be classified into three main categories, namely, job characteristics, economic environment and competition condition, Holt et al. (1994) classifies competitiveness indicators under five groups: contractor's organization, financial considerations, management resources, past experience, and past performance. Each of these groups also includes various specific indicators.

Drew and Skitmore (1993) grouped factors influencing the bidding decision into three aspects: the behavior of contractors as a group (e.g., market conditions, number and identity of competitors); individual contractor behavior (e.g., contractor size, work and tenders in hand, availability of staff); and behavior towards the characteristics of the contract (e.g., type and size of construction work, client, location). Furthermore, by using regression analysis. Hatush and Skitmore (1997) proposed a set of criteria classified in five categories for assessing contractor competitiveness, including financial soundness, technical ability, management capability, health and safety, and reputation. Shen et al. (2003) identified 98 indicators classified under six categories of social influence, technical ability, etc. All these studies provide strong reference to the development of SSFs. Lu, et al. (2008) classifies competitiveness indicators into eight group, namely, project management skills, organization structure, resources, competitive strategy, relationships, bidding, marketing, and technology.

Tan, et al. (2008) categorized the factors affecting contractors' competition strategy into seven groups:

1. Employer selection criteria: thirteen factors of this group were selected. These factors are tender price, workmanship standard, quality specification, safety requirements, construction method, construction period, liquidated damage, contractor's relevant experiences, contractor's past performance, contractor's organization, contractor's financial strength, contractor's general image, statutory restriction.
2. Tenderer's cost planning: eleven factors of this group were selected. These factors are preliminary cost, cost of tendering,

cost of financing, temporary works, portion of Nominated Subcontractors (NSC), portion of Domestic Subcontractors (DSC), labour costs, materials costs, equipment costs, plant costs, and prior quotations from suppliers and / or subcontractors.

3. Project conditions: twelve factors of this group were selected. These factors are nature of construction and installation, tightness of master Programme, coordination difficulties, involvement of public utilities, design obligation, the use of PRC/international standard, nature of project user, working and storage area, transportation condition, fabrication arrangement, subsoil and weather condition, potential labour disputes.
4. Contractual mechanism: twelve factors of this group were selected. These factors are payment terms, Technical submission and approval, progress meetings, claim restrictions, fluctuation clauses, variation of design, materials or equipment changes, provision of bonds, insurance requirement, arbitration clause, contract type (lump sum, measurement, or reimbursement), subletting restriction.
5. Tenderer's external relationship: ten factors of this group were selected. These factors are employer's personnel, Consultants, resident supervision staff (client and/ or consultant), suppliers, nominated Subcontractors (NSC), domestic Subcontractors (DSC), banks, insurance company, plants providers, adjacent owners.
6. Tenderer's internal strength: ten factors of this group were selected. These factors are managerial ability, financial conditions, control of progress, claim experiences, relevant work experiences, administration system, human resources, staff morale, present job commitment, litigation and/or arbitration experiences.
7. Competitors' situation: nine factors of this group were selected. These factors are existing number of competitors, present commitment of competitors, tenderer's special purpose to tender, projects available in the market, the possibility of joint-bid,

competitors' financial conditions, competitors' past performance, competitors' eagerness to bid, subletting to competitors.

Chan and Au (2009) listed the factors affecting contractors' competition in the following categories:

1. Project characteristics factors include intensity of contract (the ratio of contract value and contract period), project duration, location of project, project start time, project cash flow, degree of difficulty of work, risk/safety hazard, contractor's involvement in the design stage, portion of nominated subcontract works, portion of domestic subcontract works.
2. Employer/project team characteristics factors include public/private client, financial capability of the employer, employer's reputation to honor payment on time, coordination and administration skills of project team.
3. Contractor related issues factors include availability of required cash and office , need for work/current work load, need for public exposure, marketing, or establishing long term relationship with employer, past experience in similar project/company strength in the industry, past relationship with employer, relationship with subcontractors and suppliers, past loss/profit in similar projects, confidence in company work force, company's policy in production cost savings/economic use of building resources, reliability and cost certainty in cost estimate.
4. Contract documentation/administration factors include lump sum/re-measurement contracts, D&B/traditional contracts, completeness of document and design quality, amount of liquidated damages, risk in fluctuation in material and labor prices, contract conditions/specifications, insurance and bond, contingencies allowed, contract period.
5. Bidding situation factors include selective/open tendering (number of competitors), competitiveness of competitors,

tendering duration, availability of other projects in hand, bidding price.

6. Economic and social situation factors include availability of works in the market, risk involved in investment, employer's rate of return on the project, availability and quality of supervisory persons/labor/materials/equipment, labor union, public objections, statutory regulations and requirements on the type of works concerned, tax liabilities.

Critical Success Factors for Competitiveness of Contractors

There are a large number of factors determining the competitiveness of contractors, whose organization structures and governance have become more and more complicated. However, top managers in construction firms can only manage a certain number of factors simultaneously. The vast amount of factors needs to be reduced to some manageable few but critical ones before proper measures can be taken to enhance competitiveness. Flanagan and Norman (1982) [cited in (Tan et al., (2009))] identified five major factors affecting

contractors' bidding behavior: size and value of the project, and construction and managerial complexity required to complete it; regional market conditions; current and projected workload of the tenderer; type of client; and type of project. Drew and Skitmore (1992) explained that, inherent unpredictability (e.g. site performance, weather conditions), uncertainty due to incomplete design and future cost levels and costing errors are three main components affecting the competitiveness level between bidders.

Identification of factors affecting contractors' competition strategy There are many factors to be considered in selecting a bidding strategy (Ahmad and Minkarah, 1988; Green, 1989). Drew et al. (2001) examined the effect of three factors – size and value of the project, type of client and type of project – on a contractor's bidding

strategy, and he also observed that the competitiveness differences between public sector and private sector clients were comparatively small.

Stewart (2000) emphasized that, the contractors who have a competitive strategy is mainly emerge from the core competences they have such as resource, an asset, competency, process, skill, or knowledge controlled by the corporation. The level of competitiveness or in other word, the bids variability among the participated bidders may be affected by several factors. Chua and Li (2000) identified the key determining factors affecting contractors' bidding decision under four categories, namely, social and economic condition, nature of work, bid requirement and firm-related factor.

The factors for contractor competitiveness have also been explored in other countries. Kale (2002) proposed that organization structure, relationships, competitive strategy, and generic resources are the success factors for contractor competitiveness. These studies have led to a recent study by Shen et al. (2003) that presents a more comprehensive set of contractor competitiveness indicators in the development of a model for calculating a contractor's Total Competitiveness Value (TCV). Contractor competitiveness indicators are grouped into six categories in the TCV model: social influence, technical ability, financing ability and accounting status, marketing ability, management skills, and organizational structure and operations.

Dikmen and Birgonul (2003) investigated 15 success factors, including financial resources and technical capability. Skitmore (2002) explained that the appearance of the outliers bids are common to be seen in the construction contract, the reason for such character may be returned to a noncompetitive bid. The auctioneer (client, owner, principal, and consultant) in advance of the auction try to select the tenderers to provide a competitive bids aiming to perform the work satisfactorily, as well as minimizing the abortive tendering costs of those not so favored. Skitmore (2002) clarified also that, under certain circumstances, the invited tenderers may bid in order to stay in favor with the auctioneer by appearing to be

interested in obtaining the contract. By their very nature, such bids are not intended to be competitive. The trends of clients or their representatives are the ignorance of the non-competitive bids as such bids mis arrange the predictions and planning of these clients. So it will be crucial for the auctioneer's interest to be able to identify non-competitive bids for remedial action.

Felsö et al. (2005) in their investigation showed that, there are different factors affecting the competitiveness, some of these related to the regions or geographical locations, others related to the time period of the project, and other related to the size of projects. Alexandersson and Hultén (2006) emphasized that, the firms that place very low bids in tenders can be returned to the fact that these firms do have a unique competence on production methods that result in a completely different cost structure or possibilities for additional income compared to their competitors. Reichard (2006) stated that, strengthening competitiveness depends on the formulation and successful implementation of appropriate strategies on the owner side and on the side of the service provider (contractors and sub contractors). The good relationship between the contractors and the sub-contractors is considered a strong enabler for the contractors' competitiveness.

Krasnokutskaya and Seim (2007) concluded that, the bids amount of the small category contractors are in average higher than the large category contractors by between (10.05% and 17.91%). This reflects that, the margin of competitiveness for the large categories is higher than the small category contractors. Lu, et al.(2008) described the critical success factors (CSFs) identified from a survey study carried out in Mainland China. The ranking analysis of the survey results shows that 35 factors are rated as critical for determining the competitiveness of a contractor. These factors are bidding strategy, an explicit competitive strategy, relationship with government departments, cost management, sustainable development of human resources, communication and coordination among functional department, risk-management, quality management, strategic awareness and perspective, site management.

Number of competitors in the construction tender very important factors that affecting in competitiveness. Several studies by numerous researchers like {Noumba and Dinghem (2005), Felsö et al. (2005), Drew and Skitmore, 1997, Ngai et al. (2002), Skitmore (2001), and Krasnokutskaya and Seim (2007)} concluded that, greater number of bidders in competition for each project will increase the competitiveness. El-Karriri (2008) concluded that the optimal number of participants (bidders) that attain the clients' benefits and contractors' competitiveness strategy are ranged from five to ten bidders (5-10). These conclusions are recommended for the clients and consultants decision makers to take it into considerations. The output reduces the efforts, time and costs that could be spent to obtain the number of bidders that satisfy the benefits and strategies of all parties.

Tan, et al. (2008) identified that the most critical factors affecting contractors' competition strategy are tender price, tightness of master programme, financial conditions, contract type (lump sum, measurement, or reimbursement), payment terms, managerial ability, employer's personnel, competitors' eagerness to bid , cost of financing, existing number of competitors, control of progress, projects available in the market, relevant work experiences, and contractor's financial strength.

Bid Evaluation in The Construction Industry

Bid evaluation is one of the major challenges that face clients and consultants in the selection of contractors for construction works (Alsugair, 1999). This has enhanced the use of several bid evaluation strategies to help clients (public and private) in evaluating contractors' bids and select the most appropriate one. In order to improve effectiveness and efficiency of bid evaluation within the Middle East construction industry, it is critical to enhance the management of invitation and submission of bids as well as the bid evaluation strategies in use because of its paramount role in the project success.

Bid evaluation involves all the planned ways intended to achieve a purpose regarding the bids submitted pertaining to a proposed project which thereby forms an opinion of the amount, value or quality after proper examination. Strategy can be formulated only after the objectives to be accomplished have been determined. There are various bid evaluation strategies in use in the Middle East construction industry today and they can be classified into three and they are bid evaluation strategies based on cost consideration framework, pre-qualification method and multi-criteria quantitative method.

All tendering procedures and bid evaluation strategy are normally aimed at selecting the most suitable contractor for a project and securing from him a suitable offer and using this as a basis for an agreement for execution of the project (Aniekwu and Okpala, 1987). The different bid evaluation strategies used for construction projects in Middle East are classified into three groups which are discussed below:

Bid Evaluation Strategies:

- a) Cost consideration framework
- b) Pre-Qualification method
- c) Multi-criteria quantitative method

a) Cost Consideration Framework

Among all factors that may affect the selection of a contractor, cost or price consideration has for a long time been the basis of bid evaluation strategy in use in the Middle East construction industry. Although the lowest bidder system protects the public from improper practices, it has certain disadvantages. These include unreasonable low bids either accidentally or deliberately or unqualified contractor bidding which cause extensive delay, cost overrun, quality problems and increased number of disputes (Singh, 2005).

This shortcoming attached to its use in the Middle East construction industry has called for modification to be made to it as a bid evaluation strategy. Over the years some modification to the lowest bidder system were made, such as reasonable bidder and public interest which opens the door to other evaluation strategies to be adopted instead of the single criterion system of the lowest bidder system.

b) Pre-Qualification method

To ensure the quality of contractors, bid evaluation strategy based on valuation can be done beforehand with a prequalification method. Facing the client's scrutiny regarding the competency to handle the business aspects of the operation during prequalification allows the contractor to focus on the specifics of the construction project once it has passed through prequalification and been short-listed. This also allows the owner's bid evaluation strategy to focus only on the specific elements of the project, without being distracted by the other business considerations.

In the simplest meaning prequalification is a before tendering procedure which allows to choose the most appropriate candidates from amongst those declaring willingness to participate in the tendering. Prequalification is defined by Moore (1985) as the screening of construction contractors by project owners or their representatives according to a predetermined set of criteria deemed necessary for successful project performance, in order to determine the contractor's competence or ability to participate in the project bid. Clough (1986) asserts that prequalification means that the firm which wants to participate in the tendering needs to be qualified before it can be issued bidding documents or before it can submit a proposal.

The aim of prequalification is often not only contractor competence evaluation but also limitation of potential bidders. In such a case it is necessary not only to judge whether the contractor fulfills the basic criteria, but also to what degree are they fulfilled. Bid evaluation strategy makes use of certain criteria during pre-

qualification, it should be noted that not all criteria are equally important for the client. The basic issue is assigning the right weight to the criteria. However, bid evaluation strategy based on pre-qualification method is not without its own shortcoming such as the time lag between submission of bid and pre-qualification of the contractor.

c) Multi-Criteria Quantitative Method

In most cases, it can be stated that contractor's selection problem is a multi-criteria problem. The complex nature of contractor selection has made the scope of bid evaluation strategies to be widened to include the use of multi-criteria in the Middle East construction industry (Zavadskas, Liias and Turskis, 2008; Ginevicius and Podvezko, 2008; Turskis, 2008; Plebankiewicz, 2009). Bid evaluation strategies based on the multi-criteria quantitative system does not consider cost as the only awarding reason, but also considers other important attributes. The key of multi-criteria quantitative system is that the selection process of the contractors is based on more attributes such as bid price/cost, time, quality, managerial safety, accountability, competence and sufficiency of contractors (Liu et al., 2000).

The main concept of the multi-criteria bidding system is that the selection process of the contractors will be based on more attributes than just the price and the successful bidder will be the one who has the highest combined bidding value of the multiple attributes. The scores of those attributes are transformed into values and those values of all the attributes are totaled to give the combined bidding value. One multi-criteria model is the performance predicting system for contractor selection proposed by Alarcon and Mourgues (2002).

The proposed system utilizes a methodology that predicts the potential performance of the contractors under analysis. The model takes into account the most important characteristics of the contractor that influence project performance such as

contractor organization chart, contractor resources, project location, project type and others.

The use of this bid evaluation strategy in the Middle East construction industry has improved the decision taken in the selection of suitable contractor but likewise it has its own demerits in regard to time wasting. Time is usually wasted during the compilation of the various criteria and grading of the competing contractors based on the compiled multi-criteria. Also, the calculation of the highest bidding value for the multi-criteria's is very complex and tiring and any mistake during such calculation will mislead the client in the award of the contract which may have a harmful effect to the project delivery.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Studying every kind of scientific topic is time consuming. It takes a long period of time to study about a modern technology and survey it gradually. In this research, the major method using questionnaires were employed. This study aimed to determine the priority of procurement method in term of preferable being as the first objective, present the factors affecting bidding price offered as the second objective , and project characters be taken into consider by contractors as well. The instruments, questionnaires play important roles in data collection and answering the research question.

To gather data, Garavan and McGuire, (2001) recommended selecting highly experienced individuals and professionals with lots of knowledge about the role of their vocation and experiences to priority the procurement in term of most practical method based on the current working environment. In other words, determining a series of priority of procurement and suggesting the factors affecting bidding price be offered according to the professionals' ideas.

3.2 The Process of Investigation

The instrument of present study includes interview and the two series of questionnaires. Phase one in which the results were obtained based on interview question includes introducing and prioritizing procurement methods which would be applicable among Construction projects of a developing country. Phase two was carried out following phase one to determine the factors affecting bidding price (objective 2) and the considerable characteristics (objective 3) offered by contractors. The data were collected through a special process in each phase.

In order to examine the validity of the instruments in the study, a pilot study was undertaken prior to the actual data collection. A total of 10 experts working on construction projects were selected randomly to attend in the piloting study. Furthermore, 3 experts were consulted to confirm the questions and the questionnaire.

The present research consists of 3 research questions (RQ). Table 3.1 reveals a set of research questions.

Table 3.1 Research questions

Code	Research Question
RQ1	What are the priorities of procurement methods based on preferable being from contractors? (what procurement methods are more preferable in construction industry in a developing country)
RQ2	What factors affecting bidding strategy offered from a contractor in construction project tender?
RQ3	What characteristics of the project are taken into consideration by the contractor before bidding offered for a project?

3.2.1 Panel Selection for Questionnaires

In the majority of studies conducted utilizing questionnaires and interview as instruments, it is common to select interviewees and panelists. This rule explicates that the panelists need to be so knowledgeable and experienced and master the subject. They need to have motivation and be free enough to partake in the studies (Ludwig, 1996; Custer *et al.*, 1999).

Forty letters were sent to specialists in construction projects in an improving country so as to the panelists of this study be determined by the researcher. The work experience of the specialists in managing projects must not be less than seven years. Then all of them were asked whether they agreed to participate in the study or not.

3.2.2 Gathering Data from Questionnaire

Eight items related to the first objective came from the interview, twenty nine items related to the second objective, and sixteen items as the questions were developed based on comprehension approaches mentioned in literature review (See Appendix A).

3.2.3 Delphi Study (for the second and the third objectives)

Delphi study originated from well-known Oracle by whom the future was forecasted based on Greek mythology. Delphi technique initially relied on emotions and perception that were considered as its basis. Later, it was improved as a scientific method. Late in 1950s, Delphi method was utilized for evaluating and exploring the ideas of specialists in army. Since the middle of 1960s up to now

Delphi study has been known as a significant scientific technique (Turoff and Linstone, 2008).

Delphi is a process employed for reaching a scientific judgment or making scientific choices about a certain subject. Panel members are the body of specialists partaking in Delphi study known as panelists too (Custer *et al.*, 1999). It is essential for the participants to be anonymous and their discussions and responses might not be accessed by any individuals in the panel (Wellman, 1999). Moreover, another crucial thing is to prevent individuals in higher positions from impressing others such as their subordinates (Wellman, 1999). In the current research, it was attempted to keep the respondents anonymous through utilizing certain codes. The researchers selecting Classical Delphi study usually carry it out in two or four rounds. But a number of researchers lead it in three rounds (Modified Delphi). The first round of this study starts with one or some questions that the researcher designed from different resources consisting of the articles and papers written in past and discussion with chosen specialists and practitioners (Custe *et al.*, 1999).

In the current research, according to literature review, a number of items as questions were put together so that they could be as appropriate tools utilized in the Delphi study. Initially, the members of the panel ranked the significance of every individual competency utilizing a 5-point scale whereby 5 is strongly agree and one is strongly disagree. In the next round, statistical method was used to analyse the collected data. In the second round and its following rounds, in order to keep the harmony and consistency of analysis, Kendall's Coefficient of concordance was employed. On condition that the results obtained in the first round would not consistent, the procedure should be continued by round two of Delphi and its following rounds.

The following stage 1 related to first objective, another questionnaire related to second objective would be formed including 29 questions. This stage would be circulated by the researcher if needed. The members of the panel would reconsider the numerical outline of preceding stage. In other words, they would be requested to

look at the grades of central tendency and mean related to every item. They were also requested to find the similarities and differences between the findings and their own answers. This way they could conclude that if their responses and the findings were within the same range. In the case that the members of panel wanted, they could change the original rating (Bidir and Pearson, 2000). All opinions would be gathered by the researcher one more time and the Kendall's coefficient would be measured again if there would not be acceptable.

3.2.4 Tools for Analysis

In the present research, version 15.0 of Statistical Processing for Social Scientist (SPSS) was employed for the second and third objectives. This software was considered as a significant instrument for the analysis of numerical data. Initially, the raw data were transferred to this software. Coding and editing them was the next step to make them ready for further examinations and analysis. The following explanations describe the tools utilized to investigate and prove the hypothesis tests in the study.

3.2.4.1 Kendall's Coefficient of Concordance

According to Hanafin, (2004), a very crucial stage in Delphi study is to determine agreement. On the other hand, Likert scale is a technique most often used for data analysis in Delphy study (Davis and Read, 2001).

In a Delphi study, if a specific percent of the votes occurs in a prescribed range (e.g. if the inter-quartile equals or is smaller than two units on a ten-unit scale) reaching agreement is probable (Scheibe, Skutsch, and Shofer, 1975). The Kendall's

coefficient of concordance is a method that is most widely employed to define agreement. .

In the present study, for measuring the level of agreement among the panel of specialists, computing Kendall's coefficient of concordance (W) seemed necessary. Following stage 2 or more, the significance of every one of the competencies recommended by the members of panel would be identifiable. For calculating Kendall's coefficient of concordance (W), it was needed to find out the similarities and differences between the numbers obtained based on Chi-Square test and critical value (Rasli, 2005). The amount of W is noticeable and near 1, and the amount of P-value is small (lower than 0.05); it indicates the agreement between the members of panel. It also reveals that when these members were making decisions about the significance of factors, similar criteria were utilized by them.

3.3 Conclusion

In review, the items in questionnaire, the process of gathering data, selecting participants and the approaches for analyzing data are introduced. In this chapter, a set of numerical instruments that are essential for conducting the research were determined and clarified.

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